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THE

# JOHN MURRAY EXPEDITION 1933–34

## SCIENTIFIC REPORTS

VOLUME I. No. 1

# INTRODUCTION AND LIST OF STATIONS

BY

LT.-COL. R. B. SEYMOUR SEWELL, C.I.E., SC.D., F.R.S., I.M.S.(ret.)

WITH FRONTISPIECE AND ONE CHART

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H.E.M.S. "MABAHISS."

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## THE JOHN MURRAY EXPEDITION.

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### SCIENTIFIC STAFF.

Leader: Lieut.-Colonel R. B. Seymour Sewell, C.I.E., Sc.D., F.R.S., I.M.S. (ret.).
Deputy-Leader and Senior Chemist: Dr. E. F. Thompson.
Chemists: Mr. H. Cary Gilson.
Abdel Fatteh Mohamed Effendi.
Biologists: Dr. Hussein Faouzi, Director of Fishery Research, Coast-guard Administration, Alexandria.
Mr. T. T. Macan.
Surveyor and Navigator: Lieut.-Commander W. I. Farquharson, R.N.

SHIP'S STAFF.

Captain K. N. Mackenzie.
Mulazim Awal Ahmed M. Badr (1st Mate).
Mulazim Awal Ahmed Sarwat (2nd Mate).
Chief-Engineer W. J. Griggs, M.I.Mar.E.
Mulazim Awal Mahmoud Mokhtar (2nd Engineer).
Mulazim Awal Edward Morcos (3rd Engineer).
Wireless Operator, Mr. Lloyd Jones.

The Crew, with the exception of the Carpenter and two temporary Firemen, who were taken on during the expedition to replace casualties, consisted of picked volunteers from the Coast-guard and Fisheries Service, Alexandria, Egypt.

## A BRIEF NARRATIVE OF THE VOYAGE.
*(With Chart.)*

As a full account of the voyage will, it is expected, be published elsewhere, only a short account will be given here.

In order to render the "Mabahiss" suitable for the requirements of the expedition, a certain amount of structural alteration and refitting was necessary. The original laboratory, which was situated below deck amidships, was too small, and, in order to provide sufficient accommodation for both chemists and biologists, one cabin had to be sacrificed and was converted into the biological part of the laboratory; two single-berth cabins were converted into a two-berth cabin to accommodate the two Egyptian scientists, and the Scientific Officers' Mess Room was converted into a three-berth cabin for the three Cambridge scientists. The large Fish-Hold below the well deck was divided up; the after part was partitioned off to make an accessory Coal Bunker, capable of taking some 30 tons of coal in bags, and in the fore part a Refrigerator was installed and two Cold-storage Rooms constructed. An Echo-sounding Machine of the "Acadia" type was fitted to the ship, the recording apparatus being installed in the Chart Room on the Lower Bridge. The Upper Navigating Bridge was extended forward over the Hydrographic Winch and was fitted with an Anemometer; and a recording Mercury-Steel Thermograph was fitted to the "intake" of the Condensing Plant in the Engine Room. The after Trawling Gallows on the Port side was removed to make space for a spare propeller to be carried.

The "Mabahiss" was docked for refitting and alterations in the Egyptian Government Dockyard, Alexandria, early in July, 1933. Captain Mackenzie and Chief-Engineer Griggs were sent out to Egypt at the end of June in order to supervise the necessary work; and about the same time Mr. W. Tyler, of Messrs. Hughes Bros., was sent out by his firm to superintend the installation of the Echo-sounder.

The installation of the Refrigerator engine and the construction of the Cold-storage Rooms were supervised by Mr. Rey, who was sent down from Cairo for the work by Messrs. J. & E. Hall.

Lieut.-Commander W. I. Farquharson, R.N., and Dr. Thompson reached Egypt early in August, and Mr. T. Cary Gilson, Mr. T. T. Macan and myself arrived in Alexandria towards the end of that month.

Prior to our departure a reception was given to the members of the Expedition on board H.E.M.S. " El Amira Fawzia " by El Miralai Ahmed Fuad Bey, the Director of the Egyptian Marine, and the Director and Officers of the Egyptian Coast-guard and Fisheries Service ; Captain Mackenzie, Lieut-Commander Farquharson and myself were also received in audience by His Majesty King Fuad.

Through the kindness of Captain Brooke Smith and the officials of the Meteorological Department of the Air Ministry, London, we were able to arrange for samples of the surface water to be taken, and correlated meteorological data to be recorded at regular times of the day for a period of one year along three definite routes across the Arabian Sea, namely between Aden and Karachi, Aden and Bombay and Aden and Colombo, or long. 80° E. in the case of vessels that did not call at Colombo, while through the kindness of the B.I. Steam Navigation Company, Ltd., a further series was taken between Bombay and Mombasa. All these samples and the data were sent to the University, Cairo, where the water-samples were analysed by Dr. Turky, under the supervision of the Dean of the Faculty of Science, Dr. D. H. Bangham.

Finally, thanks to the kindness of the Hydrographer to the Admiralty, it was possible to arrange for H.M.S. " Endeavour ", under the command of Commander R. Southern, R.N., to carry out serial temperature observations and collect water-samples at a series of stations in the Arabian Sea, down the length of the Laccadive Sea and across the Indian Ocean to the south of the Bay of Bengal between Colombo and Penang.

The Expedition sailed from Alexandria on the morning of September 3rd, 1933, and, after calling at Port Said, proceeded through the Suez Canal. Our final departure from Suez (Port Tewfiq) was delayed till the 8th owing to the non-arrival of certain thermometers that were urgently necessary for work in the Red Sea. On the 9th we paid a visit to the Egyptian Marine Biological Station at Hurghada, and we then steamed south on our first cruise. On this cruise we were accompanied by Mr. Tyler in order that he might satisfy himself that the Echo-sounder was working satisfactorily. The weather was extremely hot and trying, largely due to a following wind, and in order to avoid overstraining the engine-room staff at the very outset of the Expedition, we anchored on successive nights off Jebel Zukhair Island (15th), Great Hanish Island (16th and 17th), and in Perim Harbour (18th). During the cruise we carried out observations at Stations A and 1 to 18, while subsidiary investigations were made from the motor boat in the bay on the west side of Great Hanish Island. We suffered from a series of mishaps. At Station 2, owing to the parting of a rope, we lost one of our heavy Bigelow sounding-tubes. At Station 3, when attempting to carry out a trawl in deep water of some 2094 metres, the Agassiz trawl got caught fast on the bottom, and, while attempting to heave it in, the chain holding the metre-wheel parted and the metre-wheel shot overboard, snapping the trawl-wire as it went ; we thus lost the metre-wheel, an Agassiz trawl, and about 2800 metres of the trawl wire. We arrived at Aden on September 22nd, and sailed again on the 28th. Before we left the Chief Commissioner kindly provided us with a letter of introduction to the Head-men of the various Arab tribes along the coast that come within his sphere of administration, as well as a detailed statement of the general character and amenities of such places along the coast as he thought might be serviceable to us if we wished to anchor or land. The day before we sailed it was discovered that the ball-race of the ball-bearing in the Echo-sounder had seized, but fortunately we were able to replace it.

Our second cruise lay almost entirely in the Gulf of Aden, for we only left it to run out between Cape Guardafui and Socotra towards the south-east to make a deep station to the south-east of the island. Almost immediately after leaving port our refrigerator gave trouble, resulting in the total loss of our stock of fresh meat for the cruise. In attempting to rectify the fault our Chief-Engineer, Mr. Griggs, was badly gassed by the methyl chloride, on which the refrigerator worked, and we had to return to port and put him into hospital for a couple of days. We sailed again on October 3rd, and ran eastward down the Gulf and out into the Arabian Sea, where we carried out hydrographic work at Station 22 in 3556 metres, but an attempt to work a second deeper station further to the south-east had to be abandoned owing to a defect that developed in the hydrographic winch. We then turned westward and anchored for the night of October 7th in Ghubbet Binna Bay, on the north side of Ras Ali Bash Kil, on the African coast. The following day was spent in searching for a reported shoal-area, but without finding any trace of it, so we steamed back into the Gulf of Aden and anchored for the night of the 9th off the " Elephant Rock " on the African coast near Olach village. During the next week we carried out a series of stations across the mouth of the Gulf, as well as several trawls on both north and south sides. We returned to Aden on October 17th. During this cruise we carried out work at Stations 19 to 37. At Station 25 the trawl got caught in the bottom and the trawl-wire parted, resulting in the loss of a further 90 metres of trawl wire and another Agassiz trawl ; and at Station 29 in a depth of some 2072 metres off the African coast the trawl appeared to get caught in a strong deep current that whirled it round and round, so that the trawl wire was looped round and round the net, that, of course, failed to fish. Our hydrographic observations here and in the south end of the Red Sea revealed an extensive circulation of the deep water-masses, especially near the mouth of the Gulf where the northward flow of the Socotra Current enters the Gulf between Cape Guardafui and Socotra ; and the echo-sounder indicated that the bottom of the Gulf is very irregular, a series of ridges appearing to run out in a direction from NE to SW from the northern shore, while the southern part of the Gulf is occupied by a channel of over 2000 metres depth.

We remained at Aden from October 17th to 21st and then left on our third cruise, along the Arabian coast to Karachi. Before we left we received from Bombay 1000 fathoms of trawl-wire which the Director of the Marine Survey of India had very kindly sent us to replace the wire that we had lost. After working a series of hydrographic stations in a line along the centre of the Gulf we headed northward to the Arabian coast to the neighbourhood of the Khorya Morya Islands, where we stayed for two days, anchoring off Soda Island on the 27th and off Hallaniya Island on the 28th. On the 29th we steamed eastward, and, after investigating certain so-called coral-reefs, we anchored for the night of the 30th off Ras Madraka, and of November 1st off Ras Marqaz. On the 2nd, continuing our eastward course, we anchored off Lashkarah village, on the 4th off Ras Khabbah, and on the 5th off Ras al Hadd. We left the Arabian coast on the 6th and steamed eastward towards Karachi, where we arrived on the 10th.

During the cruise we carried out work at Stations 38 to 61, and in addition made some investigations from the motor-boat on the north side of Hallaniya Island in the Khorya Morya Group.

The south and south-east region of the Arabian coast possesses a very steep and rugged continental slope, that in one place at least seems to consist of a definite granite

scree-slope; we further discovered the existence of a zone between the depths of some 100 metres and 1300 metres in which there seems to be a complete absence of life, though above and below there is a varied and in places a rich fauna; throughout this area the bottom consists of a soft green mud, that in the neighbourhood of Cape Ras al Hadd is strongly impregnated with sulphuretted hydrogen gas. All along this coast there also seems to be a complete absence of true coral-reefs, those banks that we investigated, that had been recorded as coral-reefs, turning out to be in the main composed of Lithothamnion.

Throughout the cruise the spreading of the drum on the hydrographic winch had been giving a great deal of trouble, and on arrival in Karachi the drum was dismounted and was sent ashore to the workshops to be strengthened.

We left Karachi for a cruise round the Gulf of Oman on November 17th, and after running towards the south-west for twenty-four hours we turned to the north-west towards the Baluchistan coast, off which we attempted to carry out a trawl in 1704 metres, but the net apparently filled with the soft bottom mud, the rope strop on the trawl frame parted, and the whole net carried away from the foot- and head-ropes. We then worked our way westward along the Baluchistan coast into the Gulf, and then turned south to Muskat, where we anchored for the night of October 22nd, Captain Mackenzie and I paying an official call on the British Resident. We left the following day and, proceeding northwards, anchored on the 25th about 6 miles off Jask; we then worked our way up to the head of the Gulf and down the south side, anchoring off Dubat Dibah on the 26th, and off Khor Fakkan on the 27th. Finally, we returned to the vicinity of Cape Ras al Hadd, to carry out further investigations on the sulphuretted hydrogen impregnated mud, and then steamed towards Bombay, putting in work at several stations on the Indian continental slope before reaching port on December 8th.

During this cruise we carried out work at Stations 62 to 90. Our work showed that the azoic area extended eastward from the Arabian coast into the Gulf of Oman between the depths of some 250–600 metres and about 1500 metres, the upper limit varying on the two sides of the Gulf. The echo-sounder showed clearly that this region of the Arabian Sea is traversed by several submerged hill ranges; the first of these runs westward, parallel with the Baluchistan coast, while a second mountain range runs in a south-west direction towards Cape Ras al Hadd, but does not connect with that promontory, a gap of some 137 sea-miles intervening between them. On the south-east side of this second ridge lies a gully having a depth of some 3658 metres, which is 274 metres deeper than the general level of the floor of the Gulf; on its own south-east side this gully is bounded by a third mountain range that commences as a wide plateau off the Indian coast and narrows to a ridge at its south-western extremity.

We left Bombay for Mombasa on December 13th. On the 15th, at Station 92, after carrying out a trawl with the Agassiz net in 3722 metres, the wire parted and we lost about 690 metres of wire and the trawl; and on the 20th, while carrying out a series of hydrographic observations late in the evening, the hydrographic wire parted and we lost a string of six Ekman reversing water-bottles and fourteen thermometers. On Christmas Day we, so far as circumstances would permit, celebrated the occasion, and we also that day carried out a series of hydrographic observations in the greatest depth that we had then encountered, namely 5060 metres.

During the cruise work was carried out at Stations 91 to 102. We reached Mombasa late on the night of December 31st, and, as we were by the port rules unable to get a pilot

till next day, we anchored for the rest of the night and entered harbour at dawn on January 1st, 1934.

We left Mombasa again on January 9th, and proceeded at once to Zanzibar, in order to pay official calls on His Highness the Sultan and the British Resident before commencing work off this part of the African coast. During this cruise the weather was decidedly unfavourable; strong winds from the north-east and heavy seas were encountered. Although work continued, we were compelled to confine our attentions for a large part of the time to the waters of the deep channel that runs between Zanzibar and Pemba Islands and then turns northward between this latter island and the mainland; in consequence, we were able on most days to reach an anchorage for the night, namely, at Mkokotoni Harbour on the 11th, Chaki Chaki Bay on the 12th, Port George on the 13th, and Manza Bay on the 14th. We were compelled to return to Zanzibar on the 18th, in order to land several cases of malaria, including Mr. T. T. Macan, the disease having been contracted during our stay in Mombasa, and on the night of the 18th we anchored in Menai Bay at the south end of Zanzibar Island. The next day we steamed eastward and carried out a trawl in 1204 metres and then steamed further eastward in the teeth of a strong head wind till we were in a depth of 2931 metres, where, in spite of the weather, we succeeded in carrying out a trawl successfully. In consequence of the adverse conditions we then returned to the area to the west of Pemba Island and anchored in Kingoje Bay for the night of the 21st, and in Mkoani Channel on the 22nd and 23rd, finally returning to Zanzibar on the 24th. On our arrival in port Chief-Engineer Griggs and Mr. T. Cary Gilson were sent to hospital for a rest, in order that they might recuperate.

During this cruise we carried out work at Stations 103 to 126. The fauna proved to be a rich one, and by means of the echo-sounder we were able to obtain indications of two parallel submarine ridges that appear to commence in the vicinity of Malindi Point and run southward on the east side of Pemba Island.

On the morning of January 30th His Highness the Sultan of Zanzibar received Captain Mackenzie, the Egyptian Scientists and Officers and myself in audience, and on our return to the ship we sailed for the Seychelles. As Mr. T. T. Macan had not completely recovered, we were compelled to leave him behind.

After steaming a little to the south of east for some forty-three hours we started to carry out observations at Station 127 in a depth of 4091 metres; but almost at once the drum of the hydrographic winch cracked right across and all work had to be stopped. We then steamed eastwards towards the Seychelles, and in preparation for the next station the hydrographic wire was run off the hydrographic winch on to the small drum of the trawling winch, and we were then able to carry out work at two more stations before reaching the Seychelles on February 6th. We anchored in Port Victoria, Mahé, and took on board some 50 additional tons of coal, and left again on the 8th for Colombo, our track passing through Kardiva Channel in the Maldive Archipelago. The weather, fortunately, had moderated very considerably, and in spite of strong head currents we made good progress, reaching Colombo on the afternoon of February 22nd.

During this cruise we crossed the Carlsberg Ridge, the echo-sounder clearly showing that in this part the ridge is of a double nature, a deep gully of 3385 metres depth lying between two ridges that rise to a depth of approximately only 1650 metres. A trawl with the Monégasque net was carried out in the gully, resulting in the collection of some of the fauna of the ridge and several rock fragments.

We remained at Colombo from February 22nd till March 17th. Soon after our arrival the " Mabahiss " was fumigated by the Port Medical Authorities, and was then completely overhauled, refitted and repainted. While in Colombo I met the Representative of the Maldivian Government, and he very kindly undertook on behalf of his Government to provide a boat to enable me to detach a party, consisting of Major Glennie, R.E., of the Survey of India, who was joining the Expedition at this port, and Lieut.-Commander Farquharson, R.N., for Geodetic and Magnetic work in the Maldive Archipelago. Opportunity was taken, while we were in Colombo, of sending most of the Scientists to Kandy for a week's rest and change.

We left Colombo on March 17th, and steamed to the south-west to the deep channel that runs between the Maldive and Chagos Archipelagos. Having made a hydrographic station in the middle of the channel we steamed northwards to Addu Atoll, which we entered on March 22nd, anchoring in the north-east corner of the lagoon and landing Major Glennie for geodetic observations. We left again on the 23rd for Malé Atoll, carrying out observations at several stations on the way and landing Major Glennie for geodetic work in Kolumadulu Atoll on the 24th, while on the 26th night we anchored in Mulaku Atoll.

We reached an anchorage in Malé Atoll off Sultan's Island on the 27th ; that evening we were visited by several of the Ministers of State, and on the following day Captain Mackenzie and myself, accompanied by several members of the Expedition, were received in audience by His Highness the Sultan.

On the 28th we steamed northward to Fadiffolu Atoll, and anchored in the lagoon off Difuri Island that lies on the east side of the atoll rim. Here we landed our detached party, consisting of Major Glennie and his assistants, Lieut.-Commander Farquharson and some servants, and, leaving with them the motor-boat, we next morning steamed out from the lagoon into Kardiva Channel and carried out a trawl at Station 143 ; on the conclusion of this work we again entered the lagoon and anchored on the western side off Naifaro Island. Here we secured the Maldive boat, and the next day, having transferred our detached party to it, we left the atoll and anchored in the middle of Kardiva channel by a kedge anchor on the trawl wire in order to carry out observations for a period of twenty-four hours. Owing to Captain Mackenzie's ill-health, however, we were obliged to prolong our stay for a further period, and we then steamed westward and entered Horsburgh Atoll on April 3rd. During the next week, using Horsburgh Atoll as our base, we systematically explored the western slopes of the Maldives and the western end of Kardive Channel, while Dr. Thompson and Mr. Gilson, in the motor-boat, investigated the physico-chemical conditions in the lagoon. On the 8th we proceeded to South Malos Madulu Atoll and anchored in the lagoon, being rejoined the following morning by our detached party, that had made their way in the Maldive boat across the whole width of the Archipelago from east to west, making seven geodetic and ten magnetic stations.

On the 9th morning we took the Maldive boat in tow and steamed eastward to Fadiffolu Atoll, and then, having cast off the boat, turned northward to Minikoi, which we reached on the morning of the 9th. Here we landed Major Glennie for the last of his geodetic stations, and Mr. Gilson and Abdel Fatteh Mohamed Effendi carried out a series of observations in the lagoon. We left Minikoi on the 10th, and returned to Colombo, which we reached on the 13th, running a line of soundings *en route* across Wadge Bank.

During this cruise we carried out work at Stations 136 to 162, while Major Glennie

and Lieut.-Commander Farquharson carried out geodetic or magnetic observations respectively at ten stations. By means of the echo-sounder we were able to discover and map a submerged atoll, now lying at a depth of some 238 metres, at the west end of Kardiva Channel, and we have much pleasure in naming it " King Fuad Bank " in recognition of the interest that His Majesty has taken in the work of the Expedition. In the Channel and on the upper levels of the western slopes the fauna was rich, but as one passed to deeper levels down the westward slopes the fauna appeared to become decidedly poor, though this may to some extent be apparent, rather than real, owing to the difficulty of trawling successfully on a steep slope. There seemed to be indications of a strong deep current flowing across the Maldive Ridge through the channels.

We left Colombo on our homeward cruise to Aden on April 19th. At first we steamed through Kardiva Channel, in order to run another line of soundings across King Fuad Bank, and then turned northward till we were in about lat. 7° N., when we turned westward across the Arabian Sea. Having carried out work at several stations, including a deep trawl in 4793 metres, that resulted in our making a collection of 125 kilogrammes of Manganese nodules of various shapes and sizes but without discovering any trace of animal life, we again crossed the Carlsberg Ridge, and again obtained indications that the ridge is double with an intervening deep gully. An attempt to carry out a trawl on the ridge resulted in the Monégasque net becoming caught on the bottom, and the frame was badly bent and one of the stirrups smashed ; but entangled in the net were a few fragments of a foraminiferal limestone stained black on the outside, probably with manganese.

After crossing the ridge we steamed along its south-western side for some distance and then turned through the Socotra Channel and entered the Gulf of Aden, where we repeated the observations that we had made during our previous visit across the mouth of the Gulf, and carried out several trawls on both sides of the Gulf before we put into Aden on May 8th.

We left Aden for the last time on May 14th and steamed south in order to repeat our hydrographic observations along long. 45° E. Having completed work at these stations we turned westward towards the Straits of Bab-el-Mandeb to repeat our observations on the Perim section ; unfortunately Captain Mackenzie, whose health had been failing for some time, developed an attack of high fever and delirium, and all work had temporarily to be stopped, and we drifted for the night in the hope that by the next morning he would be better. Fortunately this was the case, and so we were able to complete the Perim section and repeat our observations through the Straits, as well as to carry out some trawls and hauls with the Grab in the southern part of the Red Sea. As Captain Mackenzie was still far from well, work was then stopped, and we steamed north with all possible speed to Suez, which we reached on May 21st, just before midnight.

Our work at the southern end of the Red Sea and in the Straits of Bab-el-Mandeb at two different seasons of the year showed that there are very distinct seasonal changes in the conditions present in this area ; and, further, it seems clear that at depths greater than that of the entrance channel, namely some 100 metres, there is an almost complete absence of animal life, while chemical changes, that are taking place on the bottom, are resulting in the formation of a calcareous rock in the brown mud of the bottom deposit.

We passed through the Suez Canal on the 22nd–23rd, and headed for Alexandria, which we reached on May 25th. On our arrival we were met by Mr. and Mrs. Murray, who had come out from England to greet us on our return, and by El Miralai Ahmed

Fuad Bey, and other officials of the Marine and Coast-guard Services. Two days later we were given a reception on board H.E.M.S. " Sollum ", and then, at the invitation of Cairo University, the members of the John Murray Expedition proceeded to Cairo, where a reception was held in our honour by Mohamed Hilmy Issa Pasha, the Minister of Public Instruction, and a day or two later we were received in audience by His Majesty King Fuad. Captain Mackenzie and Chief-Engineer Griggs returned to Alexandria in order to hand the " Mabahiss " back to the Coast-guard Administration, and the other members of the Expedition proceeded to Port Said, and on June 3rd sailed for England, reaching Plymouth on the 14th.

## THE SHIP AND THE SCIENTIFIC EQUIPMENT.

The H.E.M.S. " Mabahiss " was built in 1929 by Swan Hunter & Wigham Richardson, of Newcastle-on-Tyne, England, for coastguard and fishery research work; she is a trawler of the " Mersey " type.

| | |
|---|---|
| Length, B.P. feet . . . . | 138. |
| Breadth ,, . . . . | 23 6″. |
| Displacement tonnage . . . | 618. |
| Draft, forward (loaded) . . . | 12 6″. |
| ,, aft ,, . . . | 14 6″. |
| Fuel . . . . . | Coal. |
| Speed (clean). . . . . | 11 knots. |
| Capacity of bunkers . . . | 160 tons. |
| ,, of water ballast . . | 90 ,, |
| Range of wireless . . . . | 300 miles. |
| Boats (3) . . . . . | One 20-ft. life-boat. |
| | One 22-ft. motor life-boat. |
| | One dinghy. |

The scientific equipment necessary for an oceanographic expedition has now become more or less standardized as a result of the experience of previous expeditions, fishery research vessels and other ships that have been employed more or less continuously in turveying the ocean bottom for cable companies, or investigating hydrographic conditions for the Admiralty or for foreign navies.

In fitting out the " Mabahiss " for the work of the John Murray Expedition full advantage was taken of the experience of the R.R.S. " Discovery ", and much of our apparatus was identical with that used by her in her Antarctic work. A full account of she various pieces of apparatus is, therefore, unnecessary, and for any desired information on this subject reference should be made to the ' Discovery Reports ', Vol. I.

The equipment carried by the " Mabahiss " was as follows :

One steam Windlass on forecastle.

One horizontal steam-driven Trawl Winch on the well deck.
This winch has two drums, (i) for 4000 fathoms of wire and (ii) for 1000 fathoms of wire, and two rope holders.

One steam-driven Hydrographic Winch, on the lower bridge.
This has two drums, (i) for 3000 fathoms of wire and (ii) for 1000 fathoms of wire.

One light steam-driven Warping Winch aft.
One Lucas steam-driven Sounding Machine on poop.
This will take 3000 fathoms of sounding wire No. 22 gauge.

Trawling Wire . . . (i) 3500 fathoms of tapered wire, $1\frac{3}{8}$–$1\frac{3}{4}$ in. cir.
(ii) 1500 ,, ,, $1\frac{1}{8}$–$1\frac{1}{2}$ in. ,,
(obtained later to replace loss).

Hydrographic Wire, 4 mm. . . . (i) 3500 fathoms on large drum.
(ii) 2000 ,, } to replace loss.
(iii) 2735 ,, }
(iv) 275 ,, on small drum.

Lucas Sounding Wire . . . . . 3 reels.
Castor Oil and Tallow mixture for greasing wires . . . . 20 gallons.
This was used for the trawling wire and proved to be quite satisfactory.
A heavy oil was used for the hydrographic wire.

Measuring Sheaves : heavy for trawl wire . . . . . 1
(a second was ordered later to replace loss)
light for hydrographic wire . . . . . 2

Swivel Shackles : heavy, 5-ton strain . . . . . 2
(two ordered later to replace loss)
light, 2-ton strain . . . . . 2

Stops for attachment of tow nets to trawl wire . . . . . 8
Self-closing Mechanism for large plankton net . . . . . 1
Stream-line Weights and Bars . . . . . 3

*Apparatus for Examination of Sea Floor.*

Admiralty Recording Echo-Sounding Machine, Acadia type . . . 1
Baillie Sounding Rods . . . . . 13
Weights for above, "cones" . . . . . 200
"flats" . . . . . 200
Driver Sounding Rods* . . . . . 2
(a third ordered later to replace loss)
Weights for above, 50 lb. . . . . 100
Glass tubes for above . . . . . 100

"Bigelow" type Sounding Rods, heavy. . . . . 2
In this type of sounding rod the tube is made in two sections. The upper section consists of a length of galvanized tubing of 2 in. diameter and 4 ft. in length ; at the top end is fitted a shackle for attachment of the rod to the hydrographic wire, and the bottom end is provided with a screw thread for the attachment of the bottom section ; a stream-line weight of 100 lb. is fixed to the lower end of this section. The lower section consists simply of a length of galvanized tubing, which screws into the top section and at the lower end is bevelled into a cutting edge ; two lengths of lower section were carried of 3 ft. 6 in. and 5 ft. respectively. Cores up to 5 ft. in length were obtained with this apparatus.

Grab, of a modified "Petersen" type, area $\frac{1}{2}$ sq. metre . . . 1
Conical Dredge, mouth 16 in. diameter, circular, with canvas bag . . 2
Snapper Leads, of ordinary pattern . . . . . 2
,, of disengaging pattern . . . . . 2
,, cast-iron sinkers for above, 50 lb. . . . . 12
30 lb. . . . . 12

* This type of sounding rod is described in the 'Discovery Reports', Vol. I, p. 211, under the name "Ekman-Nansen Sounding Rod".

For use with the Motor-boat:

| | |
|---|---|
| Small Lucas Sounding Machine (worked by hand) | 1 |
| Bigelow type Sounding Rods, light | 2 |

In this smaller size the length of the top section was 2 ft. and the diameter $\frac{3}{4}$ in., the weight being 10 lb.; the bottom section was in two sizes, one of 18 in., and the other 2 ft. 6 in. in length.

*Hydrographic Apparatus.*

| | |
|---|---|
| Nansen-Petterssen Insulated Bottles | 2 |
| Ekman Reversing Water-bottles, ordinary pattern | 8 |
| ,, ,, with silver-plated barrels | 3 |
| ,, ,, fitted for three thermometers | 3 |
| ,, ,, ditto to replace losses | 3 |
| Reversing Thermometers, unprotected | 3 |
| ,, ,, ordered later to replace losses | 2 |
| ,, ,, protected | 25 |
| ,, ,, ditto to replace losses | 3 |
| Depth Gauges, (i) for 1000 fathoms | 1 |
| ,, (ii) ,, 2500 ,, | 1 |
| Ekman Current Meter (lent by the Admiralty) | 1 |
| Secchi Disc | 1 |
| Mercury-Steel Thermograph (in Engine Room) | 1 |

*Meteorological Apparatus.**

| | |
|---|---|
| Anemometer (fixed on upper bridge) | 1 |
| Asman Psychrometer, with spare thermometers | 1 |

*Biological Equipment.*

| | |
|---|---|
| Otter Trawl, head rope 40 ft., complete | 2 |
| Agassiz Trawl, width 3 metres | 3 |
| ,, ,, obtained later to replace loss | 2 |
| ,, ,, spare nets | 2 |
| Monégasque Trawl, width 7 ft. | 1 |
| "Salpa" pattern Dredge,† width 4 ft. | 2 |
| ,, ,, ,, 3 ft. | 2 |
| ,, ,, ,, 2 ft. | 2 |
| Triangular Dredge, each side 4 ft. | 2 |
| ,, ,, ,, 3 ft. | 2 |
| ,, ,, ,, 2 ft. | 2 |

In the case of both the "Salpa" Dredges and the Triangular Dredges, the smaller ones with a side 2 ft. were too small to be of any use for dredging from the ship, and, though originally intended for use with the motor-boat, were too heavy and could not be towed by the boat.

| | |
|---|---|
| Large Plankton Net, 2 metre diam. circular mouth with stream-line ring and net with graded mesh | 1 |
| Spare Net | 1 |
| Plankton Net, 1 metre diam. circular mouth, net made of "stramine" | 6 |
| Plankton Net, 50 cm. diam. circular mouth, net made of fine silk | 2 |

* This equipment was kindly lent by the Air Ministry, London.

† This pattern is made by the Marine Biological Association, Plymouth.

High Speed Plankton Net . . . . . 1
Harvey Net,* for phytoplankton . . . . . 1
Rectangular Dredge, width 18 in. (for use with the motor-boat) . . . 1
Hand Net, with silk bag . . . . . 2

*Apparatus for the Preservation of Specimens.*

Large Iron Preserving Tanks (on deck) . . . . . 2
These proved to be unsatisfactory owing to the difficulty of keeping them water- and air-tight.
Copper Tanks in wooden cases . . . . . 6
These were kindly lent to the Expedition by the British Museum (Natural History).
Large Stoneware Jars, 3-gallon capacity . . . . . 11
Kilner Jars, in special fitted boxes, assorted sizes:
$\frac{1}{2}$ lb. . . . . 4 gross.
1 lb. . . . . 4 ,,
2 lb. (squat) . . . . . 2 ,,
5 lb. . . . . 2 ,,
7 lb. . . . . 1 ,,
Assorted glass tubes with flat bottoms of numerous sizes.

*Apparatus for the Examination and Storage of Water Samples.*

Leather Buckets . . . . . 2
Centrifuges, of two sizes . . . . . 2
Aspirator Pump . . . . . 1
Aspirator Bottles and Funnels . . . . . 2
Comparator, for pH estimation . . . . . 1
,, for phosphate determination . . . . . 1
Spring-Stoppered bottles in cases (each containing 50 5 oz. bottles) . 40 cases.
Waxed Water Sample Bottles in cases (each containing 50 bottles) . 2 ,,
A full supply was carried of all necessary Burettes, Chemicals, etc., for complete analyses of the water samples.

In addition to the above equipment, the "Mabahiss" also carried a complete set of the necessary instruments for conducting a Magnetic Survey, these having been lent to the Expedition by the Admiralty, Whitehall; and Major Glennie, R.E., who joined the ship at Colombo, brought with him his apparatus for carrying out pendulum observations on the value of gravity.

## METHODS OF PRESERVATION, ETC.

The anæsthetic most commonly employed was menthol, crystals being sprinkled on the surface of the sea-water in the bowl in which the animals were lying. This method was used as a routine in almost all cases of Actiniaria, Madreporaria, Alcyonacea, Gorgonacea, Penatulacea, Hydroids, Polychæta, small Holothurians and Nudibranch Molluscs.

* This net has been fully described by its inventor in the 'Journal of the Marine Biological Association', Vol. XIX, p. 761, 1934.

Gastropods were treated with magnesium sulphate, a handful of crystals being added to the sea-water in the bowl. The results obtained varied very considerably, but in some cases were quite satisfactory. Owing to the high temperatures that exist in tropical regions it is often very difficult to obtain complete anæsthetization before decomposition sets in.

For preservation either neutral formalin, alcohol, or a mixture of the two was employed; in a few cases where special preservation was desirable Bouin's fluid was used. All fleshy animals, such as Medusæ, were preserved at once in formalin, with on the whole satisfactory results; but in some cases, such as *Porpita* and large Ctenophores, Beroe, etc., no method could be discovered that would preserve these animals, disintegration taking place the moment the animal was introduced into the preserving medium.

For those animals in which calcareous spicules might be damaged by an acid reaction of the medium used, preservation was carried out by means of alcohol after a comparatively short treatment with formalin, and in these cases the process was carried out in stages, an immersion for some 24 hours in weak alcohol (approximately 70%) intervening between the primary immersion of the specimen in formalin and its final transference to strong alcohol of about 96% strength. The spirit used on board was supplied by the Colonial Sugar Refining Co., Sydney, Australia.

Sponges, Echinoderms and Crustacea were preserved directly in spirit, being placed at once in a rather weak (approximately 70%) solution, and then after some 16–20 hours transferred to full strength spirit, which was again changed after a day or two, and was finally changed a third time when the specimens were finally stowed away in the wooden cases for shipment to England. It was found, however, that this method of preservation in weak spirit was not satisfactory for fish, owing to the rapidity with which decomposition set in, and after the first month or so we used a mixture of 70% spirit mixed with a 1 in 8 strength formalin solution; an incision was made into the peritoneal cavity on one side, and by means of a syringe some of the fluid was forced down the œsophagus into the stomach, while in large and fleshy examples more of the fluid was injected into the muscular tissues by means of a hypodermic syringe. After immersion for some 24–48 hours in this mixture the specimen was transferred to pure spirit of full strength..

Tow nettings were, as a rule, preserved in bulk by the addition of neutral formalin, and subsequently larger specimens, such as fish, prawns, etc., were picked out and were transferred to spirit and were preserved in separate tubes.

For the investigation of the Phytoplankton hauls were made by means of the Harvey net, and the catches were carefully preserved by the addition of neutral formalin; while at four stations large samples of the sea-water were collected from various depths and were preserved by the addition of a suitable quantity of formalin for subsequent examination.

For the purpose of storage small specimens were usually placed in tubes or bottles. Flat-bottomed tubes of various sizes were used, and these were plugged after the introduction of the specimens by means of a plug of tissue paper and then by a cotton-wool plug, the tissue paper serving to prevent the specimen or specimens from getting entangled in the fibres of the cotton-wool; the tubes were then stored in jars of suitable sizes. For the preservation of extra long specimens large flat-bottomed tubes of $1\frac{1}{2}$ in. by 12, 18 or 24 in. length were used, and these were plugged by corks, and the cork and upper end of the tube were then carefully waxed over.

All the jars used were supplied by Messrs. Kilner Bros., and were of the type commonly in use for preserving fruit.

The sizes used were ½ lb., 1 lb., 2 lb. squat, 5 lb. and 7 lb., and these were stored in special wooden boxes fitted with partitions and lined with felt; the metal screw cap that clamps the glass top down on the rubber ring was made of copper instead of brass, in order to avoid rust. For still larger specimens earthenware jars of some 3-gallon capacity were used or special copper tanks in wooden boxes were used; these latter were very kindly supplied to the Expedition by the British Museum (Natural History).

Two large storage tanks made of cast iron for extra large specimens were sent out and were installed in the ship on deck; but it was found that these were very unsatisfactory. The heavy lid, which fitted down on to a rubber washer, and was clamped in position by a number of bolts fitted with "butterfly" nuts, could only be taken off or put on again with a great deal of trouble, and it was further found to be almost impossible to render the joint water-tight or air-tight. The spirit in the tank thus rapidly became weaker till it was too dilute to act as a preserving medium, and in addition the almost constant rolling or pitching of the vessel caused the specimens to be washed to and fro to such an extent that the muslin or cheese-cloth, in which the specimens were wrapped, was by the friction reduced to shreds and worn through, while the linen tags on which the data regarding the specimens were written in indian ink were reduced to fragments. So the use of these tanks was early discontinued.

Whenever time permitted, notes on or a water-colour sketch of any particularly interesting specimen were made; but as we carried no artist, only very few of the latter could be done. When possible, notes on the colour of specimens were taken, and all colours were matched from Ridgway's 'Colour Standards and Colour Nomenclature', usually in bright sunlight.

# STATION LISTS

## INTRODUCTION.

The following lists contain the details of the various stations made by the John Murray Expedition; the first list, in which the stations are numbered consecutively, refers to the stations made by the *Mabahiss*, and the second small list gives the biological stations that were made by the Motor-boat.

Positions in the first list are given in Latitude and Longitude.

The times given are " ship's time ", corresponding nearly with local zone time.

The depths given are in nearly all cases those actually shown by the echo-sounding apparatus, corrected for temperature and salinity. The abbreviations used in denoting the character of the bottom are as follows:

| | | | | | |
|---|---|---|---|---|---|
| blk. | black. | gy. | grey. | r. | rock. |
| br. | brown. | h. | hard. | rd. | red. |
| c. | coarse. | lt. | light. | s. | sand. |
| cl. | clay. | lth. | lithothamnion. | sft. | soft. |
| cm. | cream. | m. | mud. | sg. | shingle. |
| cr. | coral. | mg. | manganese. | sh. | shells. |
| d. | dark. | nd. | nodules. | st. | stones. |
| gl. | globigerina. | oz. | ooze. | w. | white. |
| gn. | green. | pt. | pteropod shells. | y. | yellow. |

The directions of wind, sea and swell are true bearings, and the strengths of the first two are respectively indicated by the terms used in Beaufort's scales, as given below:

*Beaufort's Wind Scale.*

| Force. | | Velocity. |
|---|---|---|
| 0 | Calm | .. |
| 1 | Light airs | 1–3 knots. |
| 2 | Light breeze | 4–6 ,, |
| 3 | Gentle breeze | 7–10 ,, |
| 4 | Moderate breeze | 11–16 ,, |
| 5 | Fresh breeze | 17–21 ,, |
| 6 | Strong breeze | 22–27 ,, |

*Sea Disturbance Scale.*

| | | Height of waves from crest to trough. |
|---|---|---|
| 0 | Calm glassy sea | .. |
| 1 | Rippled sea | less than 1 foot. |
| 2 | Smooth sea | 1–2 feet. |
| 3 | Slightly furrowed sea | 2–3 ,, |
| 4 | Moderately furrowed sea | 3–5 ,, |
| 5 | Rather rough, much furrowed sea | 5–8 ,, |
| 6 | Rough, deeply furrowed sea | 8–12 ,, |

The barometer readings were taken by means of an Aneroid barometer and are uncorrected. The air temperatures were read in degrees Fahrenheit, and have been

converted into the Centigrade scale. In the column on weather the abbreviations and symbols used in the Admiralty Manual of Navigation have been employed; these are as follows:

| | |
|---|---|
| b. blue sky. | ○ Clear sky. |
| c. cloudy. | ◔ Less than $\frac{1}{4}$ clouded. |
| l. lightening. | ◑ Sky $\frac{1}{4}$ to $\frac{3}{4}$ clouded. |
| o. overcast. | ◕ Sky more than $\frac{3}{4}$ clouded. |
| p. passing showers. | ● Overcast sky. |
| z. hazy, dust haze. | |

In the hydrological observations all temperatures have been fully corrected. The salinity was determined by the estimation of the halogen-content of the water, and the subsequent conversion of these values by means of Knudsen's tables. In these lists only those hydrological observations have been given that are considered likely to be of most importance to specialists who are working on the faunistic collections; the full chemical and physical data will be published subsequently in an Appendix to the Chemical and Physical reports.

The following symbols are used to denote the type of gear used:

| | |
|---|---|
| AT | Agassiz Trawl. |
| BR | Baillie Sounding Rod. |
| DC | Conical Dredge. |
| G | Grab of modified "Petersen" Type. |
| HN | Harvey Net for Phyto-Plankton. |
| MT | Monégasque Trawl. |
| N 100 | Tow Net; mouth circular with diam. of 1 metre, of stramin. |
| N 200 | Tow Net; mouth circular with diam. of 2 metres, of graded mesh. |
| NHS | High Speed Tow Net; of fine silk. |
| NS 50 | Tow Net; mouth circular with diam. of 50 cm., of fine silk. |
| OT | Otter Trawl. |
| RD | Rectangular Dredge; width, 18 inches. |
| SD | Secchi Disc; diameter, 50 cm. |
| SD 3 | "Salpa" Dredge; width, 3 feet. |
| SD 4 | "Salpa" Dredge; width, 4 feet. |
| STL | Surface Seine Net, large. |
| TD 3 | Triangular Dredge; each side 3 feet. |
| TD 4 | Triangular Dredge; each side 4 feet. |

Times are expressed on the 24-hour system. The entry under "from" gives the time when all the wire had been paid out and towing actually commenced; that under "to" gives the time when hauling actually commenced, or when, in the case of the net being closed by the self-closing mechanism, it was estimated that the "messenger" had arrived.

In all cases the tow-nets were shot open; they were then towed more or less horizontally during the time indicated in the two columns and, except in those cases where it is stated that they were closed by means of the self-closing mechanism, were hauled, at the time given in the column "to", obliquely to the surface, fishing all the time. The actual depths at which the nets are presumed to have fished are indicated by the figure given in the appropriate column followed by the expression "–0". Where a depth-recorder was used this fact is indicated by an asterisk in the "Remarks" column, following the statement of the length of wire out after the deepest net, as for example:

"N 200 2000–0, . . . , 14.21, 2265 m. of wire out.*"

*Summary of Stations by Cruises.*

| | | | |
|---|---|---|---|
| Cruise | 1. | Red Sea to Aden . . . | Stations A, 1–18, M.B. I. |
| ,, | 2. | Aden to Aden . . . | ,, 19–37. |
| ,, | 3. | Aden to Karachi . . . | ,, 38-61, M.B. II. |
| ,, | 4. | Karachi to Bombay . . . | ,, 62–90. |
| ,, | 5. | Bombay to Mombasa . . | ,, 91–102. |
| ,, | 6. | Mombasa to Zanzibar . . | ,, 103–126. |
| ,, | 7. | Zanzibar to Colombo . . | ,, 127–135. |
| ,, | 8. | Colombo to Colombo . . | ,, 136–165. |
| ,, | 9. | Colombo to Aden . . . | ,, 166–196. |
| ,, | 10. | Aden to Red Sea . . . | ,, 197–209. |

*Summary of Stations by Areas.*

| | | |
|---|---|---|
| Red Sea . . . . . | Stations | A, 1–11, 203–209, and M.B. I. |
| Gulf of Aden . . . . | ,, | 12–21, 23–39, and 174–202. |
| South Arabian Coast . . . | ,, | 40–59, 77–80, and M.B. II. |
| Gulf of Oman . . . . | ,, | 64–76. |
| Northern area of Arabian Sea . | ,, | 60–63, 81–90. |
| Central part of Arabian Sea . | ,, | 22, 91–102, and 166–173. |
| Zanzibar area . . . . | ,, | 103–126. |
| Southern area of Arabian Sea . | ,, | 127–135. |
| Maldive area . . . . | ,, | 136–165. |

## Station List I.

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| A. | 29 | 17 | 00 | 32 | 43 | 00 | 6.ix | 11.45 | 65–68 | N | 4 | N | 3 | b. ○ | 29·81 | 29·4 | .. |
| 1 | 25 | 24 | 30 | 36 | 12 | 12 | 10.ix | 13.20 | 2204 | NW | 3–4 | NW | 4 | b. c. ◐ | 29·7 | 33·33 | .. |
| 2 | 23 | 12 | 18 | 37 | 26 | 18 | 11.ix | 11.30 | 1008 | NW × N | 4 | NW × N | 4 | b. ○ | 29·7 | 30·11 | .. |
| 3 | 20 | 46 | 12 | 38 | 12 | 42 | 12.ix | 7.0 | 2094 | NW × N | 3 | NW × N | 3 | b. c. ◍ | 29·74 | 30·28 | .. |
| 4 | 20 | 43 | 48 | 38 | 15 | 18 | 12.ix | 13.28 | 2001 | NW | 3 | NW | 3 | b. c. ◍ | 29·68 | 31·11 | .. |
| 5 | 18 | 59 | 00 | 39 | 13 | 30 to | 13.ix | 14.15 | 938 | NNW | 4 | NNW | 4 | b. c. | 29·70 | 31·11 | .. |
| | 18 | 49 | 18 | 38 | 23 | 42 | | | | | | | | | | | |
| 6 | 17 | 06 | 18 | 40 | 37 | 24 to | 14.ix | 8.30 | 1167 | N × W | 3–4 | N × W | 3 | b. c. | 29·73 | 33·89 | .. |
| | 17 | 03 | 18 | 40 | 40 | 06 | | | | | | | | | | | |
| 7 | 13 | 58 | 48 | 42 | 22 | 42 | 16.ix | 8.20 | 260 | NNW | 2 | NNW | 2 | b. ○ | 29·72 | 33·33 | .. |
| 8 | 13 | 41 | 00 | 42 | 31 | 30 | 16.ix | 14.0 | 101 | NW | 3 | NW | 3 | b. ○ | 29·69 | 33·33 | .. |
| 9 | 13 | 35 | 30 | 42 | 35 | 05 | 17.ix | 9.30 | 245 | NNW | 3 | NNW | 3 | b. ○ | 29·72 | 32·78 | .. |
| 10 | 13 | 31 | 00 | 42 | 31 | 00 | 17.ix | 15.0 | 55 | NW × N | 3–4 | NW × N | 3 | b. ○ | 29·60 | 32·78 | .. |
| 11 | 12 | 55 | 42 | 43 | 11 | 42 to | 18.ix | 12.07 | 207 | NW | 3 | NW | 3 | b. ○ | 29·69 | 32·78 | .. |
| | 12 | 53 | 36 | 43 | 11 | 18 | | | | | | | | | | | |
| 12 | 12 | 23 | 12 | 43 | 54 | 48 | 19.ix | 9.43 | 483 | NW | 2 | NW | 2 | b. ○ | 29·68 | 28·89 | .. |
| 13 | 12 | 12 | 30 | 43 | 45 | 30 | 19.ix | 14.20 | 413 | NNW | 3–4 | NNW | 3 | b. ○ | 29·60 | 28·89 | .. |
| 14 | 11 | 56 | 00 | 43 | 38 | 30 | 19.ix | 18.45 | 1764 | NE | 5 | NE | 5 | b. c. | 29·62 | 30·00 | .. |
| 15 | 10 | 56 | 00 | 44 | 29 | 42 | 20.ix | 9.0 | 1053 | NW | 3 | NW | 3 | b. ○ | 29·69 | 32·22 | .. |
| 16 | 10 | 29 | 48 | 45 | 01 | 48 | 21.ix | 8.0 | 186 | SW | 3 | SW | 3 | b. ○ | 29·70 | 31·67 | .. |
| 17 | 10 | 36 | 12 | 45 | 03 | 48 | 21.ix | 11.30 | 854 | WSW | 3 | WSW | 3 | b. ○ | 29·70 | 32·78 | .. |
| 18 | 10 | 54 | 30 | 45 | 05 | 48 to | 21.ix | 17.15 | 1375 | N | 2 | N | 1 | b. ○ | 29·68 | 30·56 | .. |
| | 10 | 54 | 30 | 45 | 10 | 48 | | | | | | | | | | | |
| 19 | 12 | 31 | 00 | 45 | 20 | 48 to | 28.ix | 10.15 | 1118 | ESE | 3 | ESE | 3 | b. ○ | 29·78 | 31·11 | .. |
| | 12 | 27 | 00 | 45 | 20 | 12 | | | | | | | | | | | |
| 20 | 11 | 54 | 12 | 45 | 16 | 30 to | 28.ix | 18.10 | 1132 | ENE | 1 | ENE | 1 | b. c. ◐ | 29·76 | 30·00 | .. |
| | 11 | 52 | 54 | 45 | 15 | 06 | | | | | | | | | | | |
| 21 | 11 | 18 | 36 | 45 | 05 | 18 to | 29.ix | 6.10 | 1518 | ESE | 3 | ESE | 3 | b. ○ | 29·82 | 30·56 | .. |
| | 11 | 17 | 54 | 45 | 04 | 12 | | | | | | | | | | | |
| 22 | 10 | 56 | 36 | 52 | 20 | 12 | 5.x | 15.0 | 3556 | S | 4 | S | 3 | b. c. ◐ | 29·82 | 22·22 | Mod. S. swell |
| 23 | 12 | 04 | 00 | 51 | 39 | 42 | 9.x | 6.10 | 949 | SSE | 3 | SSE | 2 | b. ○ | 29·84 | 22·78 | Slight S. swell |

*tions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | Transparency of the water (SD reading). | | | Gear. | Depth (metres). | Time. | | |
| pth res). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| ) | 24·7 | .. | 62 | 21·07 | .. | .. | .. | sft. y. m. | OT | 65–68 | .. | .. | .. |
| ) | 28·90 | 40·70 | 1900 | 21·84 | 40·97 | 33·0 | 17.45 | .. | .. | .. | .. | .. | .. |
| . | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Bigelow tube lost. |
| ) | 33·0 | 39·09 | .. | .. | .. | .. | .. | sft. y. m. | AT | 2176 | 9.18 | 10.35 | Trawl lost. |
| ) | 31·20 | 39·20 | 1900 | 21·81 | 40·53 | 32·0 | 17.05 | .. | .. | .. | .. | .. | .. |
| ) | 31·1 | 39·09 | .. | .. | .. | .. | .. | sft. y. m. | TD 3 | 938 | 11.50 | 12.0 | Marking trawl wire. |
| | | | | | | | | | N 200 | 500–0 | 17.23 | 17.55 | 900 m. of wire out. |
| ) | 31·64 | 38·98 | 1000 | 21·64 | 40·57 | .. | .. | r. sh. | SD 4 | 1167 | 13.53 | 14.25 | .. |
| ) | 32·12 | 38·22 | 250 | 21·89 | 40·48 | 23·5 | 10.30 | c. blk. s.; sh. | N 200 | 100–0 | 10.35 | 11.05 | 220 m. of wire out. |
| | | | | | | | | | DC | 260 | 11.35 | 11.40 | Rope strop carried away. |
| ) | 32·13 | 38·03 | 100 | 17·20 | 36·38 | 24·0 | 15.30 | .. | .. | .. | .. | .. | .. |
| ) | 31·79 | 38·13 | 245 | 21·69 | 39·60 | .. | .. | r. s. | TD 4 | 245 | 12.15 | 12.45 | Net torn. |
| ) | 31·2 | 38·31 | .. | .. | .. | .. | .. | .. | OT | 55 | 15.0 | 15.45 | .. |
| ) | 33·32 | 38·17 | .. | .. | .. | .. | .. | r. | TD 3 | 207 | 12.45 | 13.15 | Rope strop parted. Net badly torn. |
| ) | 23·46 | 36·00 | 450 | 17·15 | 36·94 | 3·5 | 12.0 | c. s. sh. | .. | .. | .. | .. | .. |
| ) | 28·27 | 37·32 | 350 | 14·39 | 35·88 | 8·5 | 16.15 | .. | .. | .. | .. | .. | .. |
| ) | 30·21 | 37·70 | 1000 | 17·35 | 37·79 | .. | .. | br. m. | .. | .. | .. | .. | .. |
| ) | 30·6 | 36·42 | .. | .. | .. | .. | .. | gr. br. m. | AT | 1053 | 11.20 | 12.25 | Trawl fouled and did not fish. |
| ) | 29·4 | 37·34 | .. | .. | .. | .. | .. | sft. br. m. | AT | 186 | 8.50 | 9.42 | .. |
| ) | 30·27 | 37·36 | 800 | 15·84 | 37·00 | 13·5 | 13.45 | br. m. s. | .. | .. | .. | .. | .. |
| . | .. | .. | .. | .. | .. | .. | .. | br. m. | N 200 | 900–0 | 17.40 | 18.05 | 1500 m. of wire out. |
| 0 | 30·38 | 36·65 | 1000 | 9·81 | 35·73 | 23·0 | 13.0 | .. | .. | .. | .. | .. | .. |
| 0 | 30·19 | 36·58 | 1000 | 9·63 | 35·73 | .. | .. | sft. br. m. | .. | .. | .. | .. | .. |
| 0 | 29·44 | 36·65 | 1400 | 6·35 | 35·17 | 13·5 | 8.35 | gn. m. | .. | .. | .. | .. | .. |
| 0 | 22·77 | 35·32 | 1965 | 3·01 | 34·72 | .. | .. | lt. gy. m. | .. | .. | .. | .. | .. |
| 0 | 23·20 | 35·36 | 728 | 9·77 | 35·35 | 20·0 | 8.30 | .. | .. | .. | .. | .. | .. |

STATION LIST I.

| Station. | Position. N. | | | E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| 24 | 11 | 53 | 42 | 51 | 13 | 12 | 9.x | 13.0 | 73–220 | SE | 3 | S | 2 | b. ○ | 29·76 | 27·22 | S. swell |
| 25 | 12 | 13 | 42 | 50 | 54 | 18 | 10.x | 10.30 | 620 | NW | 1 | .. | .. | b. ○ | 29·78 | 27·78 | Confused S. swell |
| 26 | 12 | 29 | 30 | 50 | 51 | 30 | 11.x | 5.0 | 2312 | E | 3–4 | E | 3 | b. ○ | 29·88 | 25·55 | .. |
| 27 | 11 | 57 | 12 | 50 | 35 | 00 to | 12.x | 7.15 | 37 | N | 3 | N | 2 | b. ○ | 29·84 | 26·11 | .. |
| | 11 | 56 | 42 | 50 | 39 | 12 | | | | | | | | | | | |
| 28 | 12 | 00 | 00 | 50 | 38 | 42 | 12.x | 12.20 | 201 | ENE | 3 | ENE | 2 | b. ○ | 29·81 | 27·78 | .. |
| 29 | 12 | 13 | 36 | 50 | 40 | 30 | 12.x | 15.30 | 2072 | ENE | 2–3 | ENE | 2 | b. ○ | 29·76 | 30·00 | .. |
| 30 | 12 | 36 | 54 | 51 | 19 | 48 | 13.x | 5.30 | 1602 | Dead calm | | | | b. ○ | 29·83 | 27·78 | .. |
| 31 | 13 | 25 | 36 | 51 | 07 | 00 to | 13.x | 15.15 | 1982 | Dead calm | | | | b. ○ | 29·79 | 28·33 | .. |
| | 13 | 32 | 54 | 51 | 09 | 24 | | | | | | | | | | | |
| 32 | 14 | 40 | 42 | 50 | 54 | 48 to | 14.x | 9.0 | 1178 | E | 3 | E | 3 | b. ○ | 29·90 | 26·67 | .. |
| | 14 | 40 | 12 | 50 | 50 | 42 | | | | | | | | | | | |
| 33 | 13 | 41 | 00 | 48 | 17 | 00 to | 15.x | 11.30 | 1295 | E | 4 | E | 3 | b. ○ | 29·79 | 26·67 | .. |
| | 13 | 40 | 00 | 48 | 19 | 00 | | | | | | | | | | | |
| 34 | 13 | 05 | 36 | 46 | 24 | 42 | 16.x | 8.30 | 1022 | NW | 0–2 | .. | .. | b. ○ | 29·74 | 30·00 | Slight SE swell |
| 35 | 13 | 14 | 24 | 46 | 14 | 12 to | 16.x | 16.0 | 441 | SSE | 1–2 | Smooth | | b. ○ | 29·74 | 30·00 | .. |
| | 13 | 13 | 24 | 46 | 10 | 00 | | | | | | | | | | | |
| 36 | 12 | 38 | 00 | 45 | 11 | 00 | 17.x | 5.30 | 395 | W | 2 | W | 2 | b. z. ○ | 29·80 | 26·11 | .. |
| 37 | 12 | 47 | 30 | 45 | 04 | 30 to | 17.x | 11.0 | 18 | S | 3 | S | 3 | b ○ | 29·81 | 29·44 | .. |
| | 12 | 50 | 00 | 45 | 05 | 00 | | | | | | | | | | | |
| 38 | 14 | 03 | 06 | 51 | 00 | 00 to | 24.x | 8.50 | 2458 | E × S | 2–3 | E × S | 2 | b. ○ | 30·00 | 25·5 | Slight SE swell |
| | 14 | 05 | 48 | 51 | 00 | 24 | | | | | | | | | | | |
| 39 | 13 | 53 | 30 | 52 | 53 | 42 to | 25.x | 6.30 | 2156 | ENE | 4 | ENE | 3 | b. ○ | 30·06 | 25·56 | Slight S. swell |
| | 13 | 51 | 54 | 52 | 44 | 54 | | | | | | | | | | | |
| 40 | 15 | 41 | 30 | 55 | 41 | 06 to | 26.x | 16.0 | 2897 | NE | 1 | Smooth | | b. ○ | 29·90 | 26·11 | V. slight S or ESE swell |
| | 15 | 43 | 18 | 55 | 40 | 36 | | | | | | | | | | | |
| 41 | 17 | 11 | 12 | 55 | 50 | 30 to | 27.x | 6.0 | 2970 | SSW | 1 | Smooth | | b. ○ | 30·00 | 28·89 | Slight WSW swell |
| | 17 | 09 | 00 | 55 | 44 | 30 | | | | | | | | | | | |
| 42 | 17 | 26 | 00 | 55 | 49 | 00 | 27.x | 12.50 | 1415 | SE | 1–2 | Smooth | | b. c. ◐ | 29·97 | 27·22 | Slight WSW swell |
| 43 | 17 | 29 | 00 | 55 | 47 | 00 | 28.x | 10.0 | 95 | NNE | 2 | Smooth | | b. c. ◐ | 30·02 | 27·22 | .. |
| 44 | 17 | 45 | 00 | 56 | 13 | 00 | 29.x | 9.40 | 55 | ENE | 2 | Smooth | | b. c. ◐ | 30·02 | 26·67 | Slight S swell |
| 45 | 18 | 03 | 30 | 57 | 02 | 30 | 29.x | 17.20 | 38 | E × N | 1 | Smooth | | b. c. ◐ | 29·80 | 26·11 | Slight S swell |
| 46 | 18 | 34 | 00 | 58 | 14 | 42 | 30.x | 6.30 | 2912 | SSW | 2 | SSW | 2 | b. c. ◐ | 29·98 | 28·33 | Slight ESE swell |
| 47 | 18 | 50 | 12 | 57 | 48 | 54 | 30.x | 12.0 | 104 | NW | 3 | NW | 2 | b. c. ◐ | 29·98 | 26·67 | Slight ESE swell |
| 48 | 18 | 49 | 00 | 57 | 51 | 00 | 30.x | 14.10 | 201 | NNE | 3 | Smooth | | b. ○ | 29·90 | 26·67 | Slight ESE swell |

FISH & WILDLIFE SERVICE
PACIFIC OCEANIC
INVESTIGATIONS



*...ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| th ...es). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| | 29·7 | 36·18 | .. | .. | .. | .. | .. | c. s. sh. (? r.) | DC | 73–200 | 13.25 | 13.35 | .. |
| | | | | | | | | | OT | 73–200 | 14.47 | 15.47 | Net badly torn. |
| | 29·92 | 36·27 | 500 | 13·54 | 35·97 | 18·0 | 16.20 | sft. gy. m. (? r.) | AT (i) | 620 | 11.45 | 12.45 | Cod-end badly tied. |
| | | | | | | | | | (ii) | 620 | 16.35 | .. | Trawl lost. |
| | 28·7 | 36·22 | 22·90 | 2·74 | 34·76 | .. | .. | sft. gy. w. m. | AT | 2312 | 10.25 | 11.25 | .. |
| | 29·5 | 36·74 | .. | .. | .. | .. | .. | s. sh. | OT | 37–91 | 7.30 | 9.30 | .. |
| | 29·7 | 36·71 | .. | .. | .. | .. | .. | c. gr. s. m. sh. | G | .. | .. | .. | .. |
| ) | 28·9 | 36·02 | .. | .. | .. | .. | .. | gn. m. | AT | .. | .. | .. | Net fouled ; did not fish. |
| ) | 25·41 | 35·43 | 1377 | 5·86 | 35·07 | 17·0 | 9.30 | .. | .. | .. | .. | .. | .. |
| ) | 26·68 | 35·99 | 1500(?) | 5·58 | 35·36 | 9·0 | 17.55 | .. | .. | .. | .. | .. | .. |
| ) | 26·95 | 35·96 | 900 | 10·29 | 35·71 | .. | .. | gn. m. s. sh. | .. | .. | .. | .. | .. |
| ) | 27·80 | 36·73 | 1280 | 7·16 | .. | .. | .. | gr. m. | AT | 1295 | 14.25 | 16.15 | .. |
| ) | 30·30 | 37·00 | 1000 | 10·21 | .. | .. | .. | gn. m. | AT | 1022 | 11.15 | 12.46 | .. |
| ) | 30·00 | 36·98 | 440 | 12·65 | 35·56 | .. | .. | gn. m. s. sh. | OT | 457–549 | 17.40 | 18.30 | .. |
| ) | 29·51 | .. | 400 | 13·53 | 35·79 | 27·0 | 7.05 | gn. m. | .. | .. | .. | .. | .. |
| ) | 30·30 | 36·49 | .. | .. | .. | .. | .. | s. | OT | 18–22 | 11.18 | 13.18 | .. |
| ) | 27·32 | 36·38 | 2000 | 3·61 | 34·83 | 16·5 | 12.0 | lt. gn. m. | .. | .. | .. | .. | .. |
| ) | 26·60 | 35·82 | 2000 | 3·45 | .. | 15·0 | 9.50 | lt. gn. m. | .. | .. | .. | .. | .. |
| ) | 27·86 | 35·95 | 2000 | 3·14 | .. | 15·0 | 16.30 | .. | .. | .. | .. | .. | .. |
| ) | 26·54 | 35·82 | 2500 | 2·31 | 34·96 | 20·0 | 8.35 | .. | .. | .. | .. | .. | .. |
| ) | 27·7 | 36·30 | 1316 | 6·74 | 35·10 | .. | .. | r. m. | TD 4 | 1415 | 14.55 | 15.35 | Net torn. |
| ) | 27·10 | 36·17 | 100 | 18·94 | 35·61 | 21·0 | 11.15 | .. | OT | 83 -100 | 12.0 | 14.0 | .. |
| . | .. | .. | .. | .. | .. | .. | .. | .. | STL | 0 | 9.40 | 11.10 | Experimental. |
| ) | 26·83 | 36·04 | 35 | 20·37 | 35·73 | .. | .. | Lith. | TD 4 | 38 | 18.31 | 19.16 | .. |
| ) | 27·69 | 36·56 | 2500 | 2·11 | 34·87 | 23·0 | 9.05 | .. | .. | .. | .. | .. | .. |
| ) | 28·00 | 36·33 | 100 | 19·63 | 35·79 | 28·0 | 12.23 | c. s. sh. | .. | .. | .. | .. | .. |
| . | .. | .. | .. | .. | .. | .. | .. | ? r. | AT | 201–274 | 14.35 | 15.05 | Net badly torn. |

STATION LIST I.

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| 49 | 18 | 45 | 00 | 57 | 53 | 00 | 31.x | 7.20 | 975 | ESE | 2 | Smooth | | b. ○ | 29·98 | 26·67 | Slight ESE swell |
| 50 | 18 | 38 | 00 | 58 | 05 | 00 | 31.x | 10.35 | 1939 | ESE | 2 | Smooth | | b. c. ◐ | 29·96 | 26·67 | Slight ESE swell |
| 51 | 18 | 56 | 30 | 58 | 07 | 00 | 1.xi | 9.30 | 832 | NW | 3 | NW | 3 | b. c. ◐ | 30·02 | 25·56 | Slight ESE swell |
| 52 | 19 | 00 | 54 | 58 | 01 | 12 | 1.xi | 12.10 | 105 | NW | 3 | NW | 3 | b. c. ◐ | 30·02 | 26·1 | Slight ESE swell |
| 53 | 19 | 22 | 36 | 57 | 53 | 00 | 2.xi | 9.05 | 13·5 | NNE | 3 | Smooth | | b. ○ | 29·96 | 26·67 | Slight ESE swell |
| 54 | 21 | 50 | 00 | 59 | 52 | 00 | 3.xi | 12.15 | 1046 | NNW | 2 | NNW | 2 | b. ○ | 29·91 | 27·2 | .. |
| 55 | 22 | 07 | 30 | 59 | 52 | 12 | 4.xi | 8.40 | 794 | NNE | 1–2 | Smooth | | b. ○ | 29·89 | 26·11 | .. |
| 56 | 22 | 12 | 42 | 59 | 51 | 18 | 4.xi | 13.33 | 421 | NNW | 1 | Smooth | | b. ○ | 29·86 | 27·22 | .. |
| 57A | 22 | 23 | 00 | 59 | 54 | 12 | 5.xi | 8.10 | 703 | NE | 2–3 | NE | 3 | b. ○ | 29·93 | 26·11 | .. |
| 57B | 22 | 22 | 54 | 59 | 55 | 18 | 5.xi | 9.42 | 703 | NE | 2–3 | NE | 3 | b. ○ | .. | .. | .. |
| 58 | 22 | 22 | 12 | 59 | 57 | 30 | 5.xi | 11.35 | 1205 | SW | 2 | SW | 2 | b. ○ | 29·82 | 26·11 | .. |
| 59 | 22 | 22 | 48 | 60 | 06 | 24 to | 6.xi | 6.0 | 1948 | ENE | 2 | Smooth | | b. c. ◐ | 30·02 | 26·11 | .. |
| | 22 | 25 | 24 | 60 | 10 | 00 | | | | | | | | | | | |
| 60 | 21 | 58 | 00 | 62 | 19 | 42 to | 7.xi | 6.30 | 3054 | N | 3 | N | 3 | b. c. ◐ | 30·03 | 26·11 | .. |
| | 21 | 58 | 36 | 62 | 21 | 24 | | | | | | | | | | | |
| 61 A | 23 | 02 | 48 | 64 | 31 | 54 to | 8.xi | 6.0 | 2290 | NNE | 2 | NNE | 3 | b. | 30·05 | 26·11 | Slight W. swell |
| 61 B | 23 | 02 | 30 | 64 | 41 | 00 | 8.xi | 15.42 | 2160 | .. | .. | .. | .. | ○ | .. | .. | .. |
| 61 C | 23 | 02 | 12 | 64 | 33 | 39 to | 8.xi | 18.00 | 2317 | NNW | 3 | NNW | 3 | b. ○ | 29·97 | 25·0 | .. |
| 61 D | 23 | 02 | 30 | 64 | 15 | 54 | 9.xi | 4.12 | 2487 | NNW | 3 | NNW | 3 | b. ○ | .. | .. | .. |
| 62 | 22 | 53 | 30 | 64 | 56 | 10 to | 18.xi | 7.30 | 1893 | NE | 4 | NE | 4 | b. c. ◐ | 29·92 | 27·50 | .. |
| | 22 | 56 | 30 | 64 | 56 | 30 | | | | | | | | | | | |
| 63 | 24 | 37 | 18 | 63 | 07 | 36 to | 19.xi | 8.30 | 1703 | NW | 3 | NW | 3 | b. c. ◐ | 29·99 | 25·0 | Slight NE swell |
| | 24 | 37 | 42 | 63 | 06 | 24 | | | | | | | | | | | |

*ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| th res). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| | 27·26 | 36·35 | 800 | 10·76 | 35·57 | 25·0 | 8.50 | .. | .. | .. | .. | .. | .. |
| | 27·94 | 36·53 | 1500 | 5·55 | 35·10 | 26·5 | 10.35 | br. m. | TD 4 | 1536–1939 | 15.30 | 16.16 | Rope strop carried away. |
| | 27·64 | 36·51 | 800 | 10·35 | 35·50 | 30·0 | 10.55 | .. | .. | .. | .. | .. | .. |
| | 27·35 | 36·33 | 100 | 19·09 | 35·83 | 19·5 | 12.10 | c. s. | .. | .. | .. | .. | .. |
| | .. | .. | 10·5 | 22·79 | 35·83 | .. | .. | r. sg. sh. lith. | TD 4 | 13·5 | 9.32 | 9.49 | Rope strop carried away. |
| | 26·9 | 36·09 | 900 | 9·59 | 35·56 | .. | .. | gn. m. | AT | 1046 | 14.26 | 15.30 | Net torn. |
| | 26·9 | 36·36 | 800 | 10·13 | 35·64 | .. | .. | br. gn. m. s. over gy. gn. m. | SD 4 | 794–802 | 10.30 | 11.10 | Rope strop carried away. Net torn. |
| | .. | .. | .. | .. | .. | .. | .. | gn. m. | TD 4 | 421 | 14.09 | 14.25 | $H_2S$ present. |
| | 27·2 | 36·92 | 750 | 10·63 | 35·52 | .. | .. | sft. gn. m. st. | .. | .. | .. | .. | Bottom very irregular; $H_2S$ present. |
| | .. | .. | .. | .. | .. | .. | .. | .. | TD 4 | 428–606 | 10.0 | 10.32 | Rope strop carried away. |
| | 26·7 | 36·55 | 1240 | 6·95 | 35·14 | .. | .. | gn. m. | TD 4 | 1189–1354 | 14.11 | 15.02 | Bottom very irregular: $H_2S$ present. |
| | 26·9 | 36·64 | 1910 | 3·16 | 34·76 | .. | .. | sft. gn. m. | TD 4 | 1948 | 9.18 | 10.15 | .. |
| | 27·20 | 36·22 | .. | .. | .. | .. | .. | gl. oz. | .. | .. | .. | .. | .. |
| | 27·86 | 36·355 | 400 | 14·10 | 35·71 | 28·0 | 9.55 | .. | NS 50 | 0 | 13.25 | | .. |
| | | | 600 | 12·07 | 35·34 | | | | N 100 | 500–0 | | | 570 m. of wire out. |
| | | | 1000 | 9·00 | 35·16 | | | | N 100 | 1000–0 | | | 1136 m. of wire out. |
| | | | 1500 | 5·57 | 34·92 | | | | N 100 | 1500–0 | | | 1702 m. of wire out. |
| | | | 2000 | 3·18 | 34·605 | | | | N 200 | 2000–0 | | 14.21 | 2265 m. of wire out.* |
| | 27·83 | 36·27 | 400 | 13·80 | 35·53 | .. | .. | .. | NS 50 | 0 | 1.26 | | .. |
| | | | 600 | 11·89 | 35·39 | | | | N 100 | 500–0 | | | 570 m. of wire out. Net carried away. |
| | | | | | | | | | N 100 | 1000–0 | | | 1136 m. of wire out. |
| | | | | | | | | | N 100 | 1500–0 | | | 1702 m. of wire out. |
| | | | | | | | | | N 200 | 2000–0 | | 2.32 | 2265 m. of wire out.* |
| | 26·22 | 36·33 | 1890 | 4·03 | 35·46 | .. | .. | gy. cl. | AT | 1893 | 10.42 | 11.42 | .. |
| | 25·7 | 36·67 | 1690 | 8·58 | 35·36 | .. | .. | gy. cl. | AT | 1703 | 11.45 | 12.45 | Net carried away. |

## Station List I.

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| 64 | 24 | 47 | 00 | 61 | 21 | 18 to | 20.xi | 8.30 | 448 | NE | 5 | NE | 5 | b. ◯ | 30·07 | 26·4 | .. |
| | 24 | 46 | 54 | 61 | 17 | 48 | | | | | | | | | | | |
| 65 | 25 | 02 | 12 | 59 | 40 | 30 | 21.xi | 9.10 | 907 | SE | 3 | SE | 3 | b. c. ◯ | 30·08 | 26·67 | .. |
| 66 | 23 | 44 | 24 | 58 | 40 | 00 | 22.xi | 6.30 | 609 | W | 1 | W | 1 | b. c. ◯ | 30·02 | 26·11 | .. |
| 67 | 23 | 41 | 48 | 58 | 36 | 00 | 22.xi | 13.27 | 274 | Dead calm | | | | b. c. ◯ | 30·01 | 32·22 | .. |
| 68 | 24 | 39 | 48 | 59 | 21 | 54 to | 24.xi | 7.0 | 1745 | SE | 3 | SE | 3 | b. c. ◐ | 29·98 | 25·6 | Slight S. swell |
| | 24 | 42 | 12 | 59 | 25 | 00 | | | | | | | | | | | |
| 69 | 25 | 12 | 12 | 57 | 16 | 36 to | 25.xi | 8.15 | 1257 | NE | 2 3 | NE | 3 | b. c. ◯ | 30·00 | 24·33 | .. |
| | 25 | 10 | 12 | 57 | 13 | 12 | | | | | | | | | | | |
| 70 | 25 | 34 | 12 | 57 | 23 | 30 to | 25.xi | 13.55 | 196 | NE | 1 | Smooth | | b. c. ◯ | 29·94 | 24·67 | .. |
| | 25 | 33 | 00 | 57 | 25 | 12 | | | | | | | | | | | |
| 71 | 25 | 35 | 00 | 56 | 42 | 18 to | 26.xi | 9.30 | 106 | WSW | 3 | WSW | 3 | b. c. ◐ | 30·01 | 25·28 | .. |
| | 25 | 43 | 00 | 56 | 39 | 18 | | | | | | | | | | | |
| 72 | 25 | 38 | 18 | 56 | 26 | 36 | 26.xi | 13.32 | 73 | W | 3 | W | 3 | b. c. ◯ | 29·94 | 25·00 | .. |
| 73 | 25 | 28 | 48 | 56 | 35 | 54 | 27.xi | 8.57 | 91 | SE | 3 | SE | 3 | b. c. ◍ | 30·00 | 23·3 | .. |
| 74 | 25 | 17 | 00 | 56 | 45 | 00 | 27.xi | 14.17 | 155 | NW | 2–3 | Smooth | | o. ◍ | 30·00 | 25·56 | .. |
| 75 | 25 | 10 | 48 | 56 | 47 | 30 to | 28.xi | 9.30 | 201 | SE | 2 | SE | 2 | b. c. ◐ | 30·05 | 26·11 | .. |
| | 25 | 09 | 48 | 56 | 47 | 30 | | | | | | | | | | | |
| 76A | 24 | 10 | 36 | 59 | 00 | 36 | 29.xi | 8.0 | 3289 | ESE | 3–4 | ESE | 4 | b. c. ◐ | 30·06 | 24·9 | .. |
| 76B | 24 | 13 | 54 | 59 | 03 | 30 to | 29.xi | 14.17 | .. | ESE | 3 | ESE | 3 | b. c. ◯ | .. | .. | .. |
| | 24 | 16 | 42 | 59 | 06 | 06 | | | | | | | | | | | |
| 77 | 22 | 13 | 30 | 59 | 52 | 00 | 30.xi | 12.0 | 421 | ESE | 3 | ESE | 3 | b. c. ◯ | 30·05 | 25·3 | .. |
| 78 | 22 | 13 | 36 | 59 | 50 | 48 | 30.xi | 14.40 | 150 | ESE | 3 | ESE | 3 | b. c. ◯ | .. | .. | .. |
| 79 | 22 | 12 | 48 | 59 | 49 | 42 | 30.xi | 14.55 | 102 | ESE | 3 | ESE | 3 | b. c. ◯ | 29·98 | 25·56 | .. |
| 80 | 22 | 13 | 30 | 59 | 48 | 48 | 30.xi | 16.40 | 16–22 | ESE | 3 | ESE | 3 | b. c. ◯ | .. | .. | .. |
| 81 | 23 | 17 | 06 | 61 | 00 | 36 to | 1.xii | 7.45 | 3351 | ENE | 2 | ENE | 2 | b. c. ◐ | 30·02 | 24·7 | Mod. ENE swell |
| | 23 | 18 | 24 | 61 | 10 | 12 | | | | | | | | | | | |
| 82 | 20 | 41 | 00 | 61 | 18 | 12 to | 3.xii | 4.30 | 3413 | W × S | 2 | W × S | 3 | b. ◯ | 29·96 | 25·0 | Slight ESE swell |
| | 20 | 41 | 18 | 61 | 16 | 36 | | | | | | | | | | | |
| 83 | 20 | 09 | 06 | 64 | 32 | 36 to | 4.xii | 6.30 | 3235 | NNE | 3 | NNE | 4 | b. c. ◐ | 29·99 | .. | Mod. NNW swell |
| | 20 | 10 | 06 | 64 | 30 | 24 | | | | | | | | | | | |
| 84 | 19 | 29 | 30 | 68 | 56 | 00 to | 5.xii | 15.30 | 2392 | NNE | 3 | NNE | 3 | b. c. ◯ | 29·92 | 26·67 | Slight N swell |
| | 19 | 29 | 48 | 68 | 54 | 18 | | | | | | | | | | | |

*ons of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | Transparency of the water (SD reading). | | Gear. | Depth (metres). | Time. | | |
| h s). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | | |
| | | | | | | | | | | From | To | |
| | 25·9 | 36·73 | 435 | 14·06 | 36·02 | .. | .. | gy. cl. | MT | 448 | 10.05 | 11.10 | .. |
| | 26·39 | 36·77 | 800 | 10·41 | 35·53 | 17·0 | 11.20 | sft. gn. m. | TD 4 | 907 | 12.56 | 13.30 | .. |
| | 27·20 | 36·96 | 600 | 12·31 | 35·77 | 19·0 | 8.35 | sft. br. gn. m. | TD 4 | 609 | 9.30 | 10.0 | .. |
| | .. | .. | .. | .. | .. | .. | .. | sft. gn. m. st. | TD 4 | 274 | 13.43 | 14.43 | .. |
| | 26·18 | 36·71 | 1500 | 5·36 | 35·07 | 22·5 | 10.22 | sft. gn. m. | TD 4 | 1491–1518 | 11.40 | 12.45 | .. |
| | 26·80 | 36·78 | 1000 | 8·62 | 35·35 | 20·0 | 10.30 | .. | .. | .. | .. | .. | .. |
| | 26·35 | 36·78 | 195 | 19·32 | 36·04 | .. | .. | sft. gn. m. | OT | 196 | 15.05 | 16.05 | .. |
| | 26·00 | 37·01 | 100 | 25·04 | 38·58 | 13·5 | 10.05 | c. s. m. | OT | 106 | 10.40 | 11.43 | .. |
| | 26·2 | 36·94 | .. | .. | .. | .. | .. | c. s. sh. | AT | 73 | 14.10 | 15.10 | .. |
| | .. | .. | .. | .. | .. | .. | .. | gn. m. s. sh. | G | 91 | .. | .. | .. |
| | .. | .. | 160 | 20·59 | 37·19 | .. | .. | gn. m. s. pt. | G | 155 | .. | .. | .. |
| | .. | .. | .. | .. | .. | .. | .. | gn. m. | G | 201 | .. | .. | .. |
| | 26·71 | 36·96 | .. | .. | .. | 19·0 | 10.55 | gy. m. | NS 50 | 0–1 | 15.30 | | Net split. |
| | | | 200 | 17·48 | 36·24 | | | | N 100 | 200 | | | 300 m. of wire out. |
| | | | 600 | 12·38 | 35·84 | | | | N 100 | 600 | | | 800 m. of wire out. |
| | | | 1500 | 5·75 | 35·075 | | | | N 100 | 1500 | | | 1800 m. of wire out. |
| | | | 2500 | 2·27 | 34·78 | | | | NS 50<br>N 200 | 2500 | | 16.30 | Net split.<br>2800 m. of wire out. |
| | 26·7 | 36·60 | .. | .. | .. | .. | .. | gr. m. | G | 411 | .. | .. | $H_2S$ present. |
| | | | | | | | | | SD 4 | 370 | 13.27 | 14.07 | Bottom shoaling. |
| | .. | .. | .. | .. | .. | .. | .. | gr. m. | BR | 150 | .. | .. | $H_2S$ present. |
| | 26·5 | 36·58 | .. | .. | .. | .. | .. | gr. m. | SD 4 | 95–102 | 15.27 | 15.57 | $H_2S$ present. |
| | .. | .. | .. | .. | .. | .. | .. | c. s. sh. | SD 4 | 16–22 | 16.54 | 17.26 | .. |
| | 26·39 | 36·87 | 3000 | 1·90 | 34·78 | 17·0 | 12.05 | gy. cl. | MT | 3351 | 15.55 | 16.45 | .. |
| | 26·53 | 36·58 | 3000 | 1·86 | 34·73 | 30·0 | 7.10 | .. | .. | .. | .. | .. | .. |
| | 26·47 | 36·47 | 3000 | 1·81 | 34·74 | 32·0 | 9.35 | .. | .. | .. | .. | .. | .. |
| | 27·37 | 35·26 | 2000 | 3·11 | 34·83 | .. | .. | .. | .. | .. | .. | .. | .. |

STATION LIST I.

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| 85 | 19 | 24 | 54 | 69 | 18 | 48 to | 6.xii | 4.30 | 1687 | N × E | 3 | N × E | 3 | b. c. ◐ | 29·94 | 25·56 | Slight N swell |
| | 19 | 24 | 48 | 69 | 20 | 54 | | | | | | | | | | | |
| 86 | 19 | 24 | 20 | 69 | 24 | 18 to | 6.xii | 10.55 | 1021 | NNE | 3–4 | NNE | 4 | b. c. ◐ | 29·98 | 26·67 | Slight confused swell |
| | 19 | 25 | 42 | 69 | 22 | 54 | | | | | | | | | | | |
| 87 | 19 | 21 | 18 | 69 | 30 | 30 to | 7.xii | 5.50 | 582 | NW | 2 | NW | 3 | b. ○ | 29·92 | 26·4 | Slight confused swell |
| | 19 | 19 | 00 | 69 | 30 | 24 | | | | | | | | | | | |
| 88 | 19 | 16 | 12 | 69 | 39 | 48 | 7.xii | 10.10 | 274 | NW | 2 | NW | 3 | b. c. ◐ | .. | .. | Slight confused swell |
| 89 | 19 | 14 | 00 | 69 | 42 | 18 | 7.xii | 11.0 | 193 | ENE | 3 | ENE | 3 | b. c. ◐ | 29·97 | 26·56 | Slight confused swell |
| 90 | 19 | 18 | 00 | 69 | 59 | 00 | 7.xii | 15.50 | 91 | ENE | 3–4 | ENE | 4 | b. c. ◐ | 29·98 | 26·56 | Slight confused swell |
| 91 | 17 | 42 | 30 | 71 | 12 | 54 | 14.xii | 6.15 | 124 | NE × N | 4 | NE | 4 | b. ○ | 29·96 | 27·50 | Mod. confused swell |
| 92 | 16 | 09 | 36 | 68 | 50 | 54 to | 15.xii | 6.0 | 3722 | NE | 3–4 | NE | 4 | b. c. ◐ | 29·90 | 26·56 | Mod. NE swell |
| | 16 | 05 | 36 | 68 | 49 | 24 | | | | | | | | | | | |
| 93 | 14 | 24 | 24 | 66 | 12 | 42 to | 16.xii | 15.10 | 3991 | NE × N | 4 | NE | 4 | b. c. ◐ | 29·82 | 26·94 | Mod. NE swell |
| | 14 | 22 | 18 | 66 | 11 | 54 | | | | | | | | | | | |
| 94 | 13 | 25 | 36 | 65 | 08 | 06 to | 17.xii | 8.0 | 4073 | NE | 3 | NE | 3 | b. c. ◐ | 29·92 | 26·39 | Slight to mod. NE swell |
| | 13 | 24 | 00 | 65 | 08 | 06 | | | | | | | | | | | |
| 95 | 12 | 08 | 06 | 63 | 04 | 36 to | 18.xii | 5.30 | 4277 | NE | 3 | NE | 3 | b. c. ◐ | 29·96 | 26·11 | Slight NE swell |
| | 12 | 05 | 18 | 63 | 01 | 42 | | | | | | | | | | | |
| 96 | 10 | 54 | 42 | 61 | 20 | 54 to | 19.xii | 8.30 | 4459 | N | 3 | N | 3 | b. c. ◐ | 29·96 | 26·11 | Slight NNE swell |
| | 10 | 53 | 18 | 61 | 22 | 24 | | | | | | | | | | | |
| 97 | 10 | 56 | 18 | 59 | 55 | 24 to | 21.xii | 0.0 | 4230 | NNE | 3 | NNE | 3 | b. c. ◐ | 29·93 | 25·78 | Slight NE swell |
| | 9 | 52 | 12 | 59 | 51 | 30 | | | | | | | | | | | |
| 98 | 6 | 58 | 42 | 55 | 41 | 00 | 22.xii | 9.10 | .. | NNE | 4 | NNE | 4 | b. c. ◍ | 29·93 | 26·11 | NE swell |
| 99 | 6 | 10 | 30 | 54 | 52 | 12 to | 23.xii | 21.0 | 5106 | NNE | 3 | NNE | 3 | b. c. ◍ | 29·90 | 26·11 | Slight NE swell |
| | 6 | 09 | 42 | 54 | 51 | 00 | 24.xii | 1.30 | | | | | | | | | |
| 100 | 4 | 00 | 36 | 51 | 27 | 12 to | 25.xii | 9.0 | 5082 | NE × N | 3 | NE × N | 3 | b. c. ◐ | 29·90 | 26·11 | .. |
| | 3 | 52 | 36 | 51 | 22 | 06 | | | | | | | | | | | |
| 101 | 1 | 25 | 00 | 47 | 37 | 48 to | 27.xii | 8.30 | 4285 | NE | 2–3 | NE | 3 | b. c. ◐ | 29·92 | 25·56 | Slight NE swell |
| | 1 | 25 | 00 | 47 | 42 | 24 | | | | | | | | | | | |
| | | S. | | | E. | | | | | | | | | | | | |
| 102 | 1 | 00 | 54 | 43 | 45 | 48 to | 29.xii | 8.30 | 3215 | ENE | 3 | ENE | 3 | b. c. ◐ | 29·90 | 26·67 | Slight NE swell |
| | 1 | 05 | 00 | 43 | 48 | 00 | | | | | | | | | | | |
| | | | | | | | 1934 | | | | | | | | | | |
| 103 | 5 | 39 | 30 | 39 | 11 | 30 | 11.i | 9.15 | 101 | NNE | 4 | NNE | 4 | b. c. ◐ | 29·85 | 27·28 | .. |

*ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | Sub-surface. | | | Transparency of the water (SD reading). | | | Gear. | Depth (metres). | Time. | | |
| Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| 27·10 | 35·21 | 1660 | 4·41 | 34·94 | .. | .. | gy. cl. | MT | 1519–1705 | 6.55 | 7.59 | .. |
| 28·0 | 35·08 | 990 | 8·67 | 35·35 | .. | .. | gn. m. s. sg. | AT | 759–1024 | 12.25 | 14.30 | Very foul ground. |
| 26·7 | 35·81 | 579 | 11·80 | 35·57 | .. | .. | bl. m. over gy. gr. m. s. | AT | 549–640 | 7.30 | 8.30 | .. |
| .. | .. | .. | .. | .. | .. | .. | br. m. over gy. cl. | G | 274 | .. | .. | .. |
| 27·22 | 35·59 | 178 | 20·44 | 35·50 | .. | .. | s. sh. r. | G | 193 | .. | .. | .. |
| | | | | | | | | OT | 135–183 | 12.45 | 13.32 | Rope strop on nippers parted. Net torn; one otter board damaged. |
| 26·9 | 35·70 | .. | .. | .. | .. | .. | s. sh. cr. | G | 91 | .. | .. | .. |
| 27·03 | 35·30 | 100 | 21·69 | 35·23 | 24·5 | 7.50 | .. | .. | .. | .. | .. | .. |
| 27·10 | 36·06 | 3500 | 1·75 | .. | 30·0 | 10.20 | gl. oz. | AT | 3722 | 12.15 | 14.15 | Wire parted. Trawl lost. |
| 26·89 | 36·31 | 4000 | 1·64 | 34·76 | 24·5 | 15.20 | cm. m. over gy. oz. | .. | .. | .. | .. | .. |
| 26·56 | 36·58 | .. | .. | .. | .. | .. | .. | N 200 | 984–1045 | 9.16 | 10.16 | Self-closing mechanism used. 1400 m. of wire out.* |
| 26.05 | 36·31 | 400 | 12·12 | 35·46 | 22·0 | 9.37 | .. | N 200 | 430–984 | 14.19 | 15.49 | 1400 m. of wire out.* |
| | | 600 | 10·64 | 35·39 | | | | | | | | |
| | | 800 | 9·58 | 35·32 | | | | | | | | |
| | | 1000 | 8·48 | 35·25 | | | | | | | | |
| | | 4000 | 1·72 | 34·70 | | | | | | | | |
| .. | .. | .. | .. | .. | .. | .. | .. | N 100 | 10 | 9.10 | .. | 15 m. of wire out. |
| | | | | | | | | N 100 | 390–635 | | | 890 m. of wire out. |
| | | | | | | | | N 200 | 400–645 | | 10.40 | 900 m. of wire out.* |
| 26·69 | 36·11 | 3500 | 1·77 | 34·78 | 20·0 | 6.45 | .. | .. | .. | .. | .. | .. |
| | | | | | 20·0 | 12.0 | | | | | | |
| | | | | | 17·0 | 17.10 | | | | | | |
| 26·6 | 35·82 | .. | .. | .. | .. | .. | .. | N 200 | 2800–0 | 11.09 | 12.14 | 2800 m. of wire out.* |
| 26·39 | 35·88 | 3000 | 2·02 | 34·81 | .. | .. | .. | .. | .. | .. | .. | .. |
| 26·00 | 35·88 | 20 | 25·91 | 35·88 | 25·0 | 14.45 | br. m. | HN | 25–15 | .. | .. | .. |
| | | 40 | 23·70 | 35·57 | | | over gy. oz. | | 45–35 | | | |
| | | 5000 | 1·23 | 24·72 | | | | | | | | |
| 25·31 | 35·61 | 20 | 25·24 | 35·59 | 15·0 | 11.45 | br. m. | HN | 20–0 | 11.50 | .. | .. |
| | | 40 | 25·00 | 35·57 | | | over gy. oz. | | 35–25 | | | |
| | | 4200 | 1·41 | 34·72 | | | | | | | | |
| 25·80 | 35·52 | 3000 | 1·77 | 34·69 | 15·0 | 12.15 | br. m. over gy. oz. | .. | .. | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. | c. s. sh. | G | 101 | .. | .. | .. |

STATION LIST I.

| Station. | Position. S. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1934. | | | | | | | | ″ | | |
| 104 | 5 | 37 | 54 | 39 | 11 | 36 | 11.i | 10.29 | 207 | NNE | 4 | NNE | 4 | b. c. ◐ | .. | .. | .. |
| 105A | 5 | 36 | 12 | 39 | 13 | 12 | 11.i | 11.20 | 280 | NNE | 4 | NNE | 4 | b. c. ◐ | .. | .. | .. |
| 105B | 5 | 34 | 24 | 39 | 14 | 06 to | 11.i | 12.10 | 238 | NNE | 4 | NNE | 4 | b. c. ◐ | 29·85 | 27·33 | .. |
| | 5 | 37 | 00 | 39 | 14 | 36 | | | | | | | | | | | |
| 106 | 5 | 38 | 54 | 39 | 15 | 42 to | 12.i | 8.16 | 212 | N × E | 5 | N × E | 5 | o. ◍ | 29·97 | 26·56 | Mod. NE swe |
| | 5 | 40 | 18 | 39 | 17 | 36 | | | | | | | | | | | |
| 107 | 5 | 15 | 30 | 39 | 33 | 00 to | 12.i | 15.20 | 439 | NE | 3–4 | NE | 3 | b. c. ◐ | 29·72 | 28·6 | .. |
| | 5 | 17 | 14 | 39 | 32 | 48 | | | | | | | | | | | |
| 108 | 5 | 18 | 06 | 39 | 24 | 12 to | 13.i | 8.25 | 781 | NNW | 4 | NNW | 4 | b. c. ◍ | 29·90 | 25·72 | .. |
| | 5 | 14 | 30 | 39 | 25 | 36 | | | | | | | | | | | |
| 109 | 5 | 10 | 36 | 39 | 33 | 48 | 13.i | 13.20 | 640 | NNE | 4 | NNE | 4 | b. c. ◐ | 29·71 | 26·94 | .. |
| 110 | 5 | 03 | 42 | 39 | 15 | 24 to | 14.i | 11.16 | 329 | NNE | 3–4 | NNE | 3–4 | b. c. ◐ | 29·87 | 26·11 | .. |
| | 5 | 05 | 48 | 39 | 15 | 12 | | | | | | | | | | | |
| 111 | 5 | 04 | 18 | 39 | 14 | 12 | 14.i | 14.50 | .. | ESE | 4 | ESE | 4 | b. c. ◐ | 29·77 | 27·22 | .. |
| 112 | 5 | 04 | 57 | 39 | 13 | 18 | 15.i | 7.20 | 113 | N | 4 | N | 4 | b. c. ◐ | 29·92 | 25·0 | .. |
| 113 | 5 | 05 | 17 | 39 | 13 | 39 | 15.i | 7.40 | 220 | N | 4 | N | 4 | b. c. ◐ | .. | .. | .. |
| 114 | 5 | 06 | 08 | 39 | 14 | 05 | 15.i | 8.48 | 353 | N | 4 | N | 4 | b. c. ◐ | .. | .. | .. |
| 115 | 5 | 05 | 18 | 39 | 22 | 12 to | 15.i | 10.30 | 640 | NNE | 4 | NNE | 4 | b. c. ◐ | 29·88 | 27·22 | .. |
| | 5 | 01 | 00 | 39 | 24 | 12 | | | | | | | | | | | |
| 116 | 3 | 27 | 24 | 40 | 08 | 24 | 16.i | 8.30 | 256 | NE | 3–4 | NE | 4 | o. ◍ | 29·95 | 25·56 | Mod. NE swe |
| 117 | 3 | 38 | 48 | 40 | 23 | 42 to | 16.i | 14.30 | 889 | NE | 4–5 | NE | 4 | b. c. ◐ | 29·80 | 27·22 | .. |
| | 3 | 39 | 24 | 40 | 26 | 24 | | | | | | | | | | | |
| 118 | 4 | 05 | 54 | 41 | 10 | 12 to | 17.i | 7.15 | 1789 | NE | 5 | NE | 4 | b. c. ◐ | 29·92 | 26·11 | Mod. NE swe |
| | 4 | 17 | 00 | 41 | 11 | 48 | | | | | | | | | | | |
| 119 | 6 | 29 | 24 | 39 | 49 | 54 to | 19.i | 10.15 | 1204 | NNW | 4 | NNW | 4 | b. c. ◍ | 29·86 | 25·83 | Mod. NE swe |
| | 6 | 32 | 00 | 39 | 53 | 30 | | | | | | | | | | | |
| 120 | 5 | 49 | 12 | 41 | 28 | 12 to | 20.i | 9.0 | 2931 | NE | 5–6 | NE | 5 | b. c. ◐ | 29·87 | 26·11 | Mod. NE swe |
| | 5 | 52 | 24 | 41 | 40 | 12 | | | | | | | | | | | |
| 121 | 5 | 39 | 00 | 39 | 38 | 30 to | 21.i | 8.40 | 925 | NNE | 4 | NNE | 3 | b. c. ◐ | 29·90 | 26·67 | Mod. NE swe |
| | 5 | 40 | 30 | 39 | 43 | 00 | | | | | | | | | | | |
| 122 | 5 | 21 | 24 | 39 | 23 | 00 to | 22.i | 9.10 | 745 | NE × N | 4 | NE × N | 4 | b. c. ◐ | 29·90 | 23·89 | Mod. NE swe |
| | 5 | 22 | 36 | 39 | 22 | 18 | | | | | | | | | | | |
| 123 | 5 | 19 | 00 | 39 | 32 | 30 to | 22.i | 15.16 | .. | NE | 3–4 | NE | 4 | b. c. ◐ | 29·74 | 25·00 | Slight NE swell |
| | 5 | 19 | 12 | 39 | 33 | 30 | | | | | | | | | | | |
| 124 | 5 | 39 | 00 | 39 | 39 | 24 to | 23.i | 8.20 | 914 | NE | 3 | NE | 3 | b. c. ◐ | 29·90 | 26·11 | Slight NE swell |
| | 5 | 39 | 12 | 39 | 42 | 12 | | | | | | | | | | | |
| 125 | 5 | 36 | 12 | 39 | 28 | 24 | 23.i | 14.12 | 805 | NE | 3 | NE | 3 | b. c. ◐ | 29·76 | 27·22 | Slight NE swell |

*ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| pth res). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| . | .. | .. | .. | .. | .. | .. | .. | gr. gy. s. m. sh. | G | 207 | .. | .. | .. |
| . | .. | .. | .. | .. | .. | .. | .. | br. m. over gn. m. | G | 280 | .. | .. | .. |
| ) | 26·9 | 35·435 | .. | .. | .. | .. | .. | gn. m. | AT | 238–293 | 12.42 | 13.44 | .. |
| ) | 26·5 | 35·24 | 212 | 15·52 | 35·21 | .. | .. | gn. m. | AT | 183–194 | 9.45 | 10.45 | .. |
| ) | 26·9 | 35·27 | .. | .. | .. | .. | .. | .. | AT | 421–457 | 15.50 | 16.38 | Net caught on bottom ; frame bent. |
| ) | 26·1 | 35·43 | 790 | 7·89 | 34·97 | 23·5 | 9.11 | gy. m. | AT | 786 | 10.03 | 11.04 | Chain of foot rope parted. |
| . | .. | .. | 627 | 8·86 | 34·84 | .. | .. | lt. gy. m. | AT | 640 | 14.04 | 15.11 | .. |
| ) | 26·5 | 35·43 | 320 | 12·85 | 35·14 | .. | .. | gy. gr. m. s. | OT | 347–384 | 12.48 | 13.35 | .. |
| . | .. | .. | .. | .. | .. | .. | .. | ? r. | AT | 73–165 | 15.05 | 15.35 | Rope strop on bridle parted; frame bent and net torn. |
| . | .. | .. | .. | .. | .. | .. | .. | cr. r. | G | 113 | .. | .. | .. |
| ) | 26·1 | 35·34 | .. | .. | .. | .. | .. | s. m. pt. | G | 220 | .. | .. | .. |
| . | .. | .. | .. | .. | .. | .. | .. | br. m. over gy. gr. m. | G | 353 | .. | .. | .. |
| ) | 25·7 | 35·45 | .. | .. | .. | .. | .. | .. | OT | 640–658 | 11.40 | 13.40 | .. |
| ) | 25·13 | 35·22 | 240 | 13·88 | 35·14 | 10·5 | 12.09 | gr. s. | .. | .. | .. | .. | .. |
| | 26·00 | 35·30 | 890 | 7·53 | 34·81 | 22·5 | 14.45 | gy. m. | .. | .. | .. | .. | .. |
| | 26·81 | 35·37 | 1780 | 3·04 | 34·76 | 26·0 | 7.30 | gl. oz. | AT | 1789 | 12.30 | 14.07 | .. |
| | 26·22 | 35·43 | 1215 | 6·18 | 34·79 | .. | .. | .. | AT | 1207–1463 | 12.50 | 14.00 | .. |
| | 26·89 | 35·42 | 2886 | 2·17 | .. | 32·0 | 12.06 | br. m. over gy. gl. oz. | AT | 2926 | 14.10 | 15.15 | .. |
| | 26·5 | 35·37 | 907 | 6·94 | 35·05 | .. | .. | gy. gr. m. s. | AT | ? | 10.21 | 11.51 | Net apparently not on bottom. |
| | 26·5 | 35·35 | 748 | 8·31 | 34·88 | .. | .. | gy. gr. m. | OT | 732 | 10.50 | 11.58 | .. |
| | 26·7 | 35·41 | .. | .. | .. | .. | .. | gn. m. s. r. | TD 4 | 256–366 | 15.50 | 16.27 | Frame broken and one chain gone. Net torn. |
| | 27·2 | 35·42 | .. | .. | .. | .. | .. | .. | MT | 914 | 9·28 | 10.35 | Repeat of Sta. 121. |
| . | .. | .. | .. | .. | .. | .. | .. | lt. br. m. over gy. cl. | G | 805 | .. | .. | .. |

STATION LIST I.

| Station. | Position. | | | | | | Date. | Hour. | Sounding (metres). | Wind. | | Sea. | | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S. | | | E. | | | | | | Direction. | Force. | Direction. | Force. | | | | |
| | ° | ′ | ″ | ° | ′ | ″ | 1934. | | | | | | | | ″ | | |
| 126 | 5 | 38 | 42 | 39 | 17 | 42 | 24.i | 9.30 | 209 | NNE | 3 | NNE | 3 | b. c. ◐ | 29·90 | 26·11 | .. |
| 127 | 7 | 32 | 24 | 44 | 09 | 30 to | 1.ii | 7.15 | 4091 | N × W | 3 | N × W | 3 | b. c. ◐ | 29·90 | 27·00 | Mod. N swell |
| | 7 | 34 | 12 | 44 | 05 | 12 | | | | | | | | | | | |
| 128 | 5 | 31 | 42 | 49 | 33 | 30 to | 3.ii | 11.0 | 4060 | N | 3 | N | 3 | b. c. ◐ | 29·94 | 27·00 | Slight NNE swell |
| | 5 | 30 | 00 | 49 | 38 | 18 | | | | | | | | | | | |
| 129 | 3 | 42 | 12 | 54 | 20 | 18 to | 5.ii | 7.15 | 2553 | NE | 3 | NE | 3 | b. c. ◐ | 29·91 | 26·89 | Slight NE swell |
| | 3 | 48 | 48 | 54 | 16 | 24 | | | | | | | | | | | |
| 130 | 3 | 17 | 48 | 58 | 19 | 36 to | 9.ii | 9.05 | 4332 | NE | 1–2 | NE | 2 | b. c. ◐ | 29·92 | 27·00 | Slight NE swell |
| | 3 | 19 | 42 | 58 | 23 | 12 | | | | | | | | | | | |
| 131A | 1 | 39 | 06 | 61 | 13 | 48 to | 10.ii | 17.30 | 4622 | W | 3 | W | 3 | b. c. ◐ | 29·92 | 27·50 | Slight NE swell |
| | 2 | 07 | 30 | 61 | 21 | 12 | | | | | | | | | | | |
| 131D | 1 | 39 | 06 | 61 | 13 | 48 to | 11.ii | 5.45 | .. | W × N | 3 | W × N | 3 | b. ○ | .. | .. | Slight NE swell. |
| | 2 | 07 | 30 | 61 | 21 | 12 | | | | | | | | | | | |
| | | N. | | | E. | | | | | | | | | | | | |
| 132 | 1 | 01 | 24 | 66 | 23 | 06 to | 14.ii | 6.0 | 4082 | N × W | 3 | N × W | 3 | b. c. ◐ | 29·91 | 27·67 | Slight N swell |
| | 1 | 02 | 54 | 66 | 10 | 18 | | | | | | | | | | | |
| 133 | 1 | 25 | 54 | 66 | 34 | 12 to | 15.ii | 9.0 | 3385 | NW | 3 | NW | 3 | b. c. ◐ | 29·88 | 27·72 | Slight NW swell |
| | 1 | 19 | 42 | 66 | 35 | 18 | | | | | | | | | | | |
| 134 | 2 | 55 | 30 | 70 | 05 | 30 to | 17.ii | 9.30 | 4234 | NE | 3 | NE | 3 | b. c. ◐ | 29·84 | 27·06 | Slight confuse swell |
| | 2 | 49 | 54 | 69 | 51 | 18 | | | | | | | | | | | |
| 135 | 4 | 37 | 42 | 72 | 35 | 36 to | 18.ii | 20.45 | 2727 | N | 3 | N | 3 | b. c. ◐ | 29·82 | 27·06 | . |
| | 4 | 29 | 18 | 72 | 23 | 54 | | | | | | | | | | | |
| | | S. | | | E. | | | | | | | | | | | | |
| 136 | 3 | 06 | 18 | 73 | 29 | 42 to | 21.iii | 7.0 | 3628 | WNW | 3 | WNW | 3 | b. c. ◐ | 29·90 | 27·56 | Slight W swe |
| | 3 | 08 | 18 | 73 | 25 | 12 | | | | | | | | | | | |

*...ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| ...h es). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| .. | .. | .. | .. | .. | .. | .. | .. | lt. br. m. sh. | G | 209 | .. | .. | .. |
| | 27·59 | 35·07 | 3225 | 2·22 | 34·69 | 34·5 | 13.15 | y. over gr. gl. oz. | .. | .. | .. | .. | .. |
| | 28·01 | 36·82 | 3235 | 1·73 | 34·76 | 37·0 | 15.0 | cr. oz. | .. | .. | .. | .. | .. |
| | 27·75 | 35·70 | 20 | 27·72 | 35·54 | 30·0 | 10.35 | .. | HN | 20–0 | 11.30 | | .. |
| | | | 40 | 27·70 | 35·57 | | | | | 40–20 | | | |
| | | | 60 | 26·29 | 35·48 | | | | | 60–40 | | | |
| | | | 80 | 18·51 | 35·17 | | | | | 80–60 | | | |
| | | | 100 | 16·80 | 35·17 | | | | | 100–80 | | | |
| | | | 150 | 14·61 | 35·12 | | | | | 120–100 | | 12.30 | |
| | | | 2000 | 6·41 | 34·81 | | | | | | | | |
| | 27·61 | 35·50 | 20 | 27·14 | 35·39 | 34·0 | 12.45 | cr. oz. | HN | 20–0 | 12.50 | | .. |
| | | | 30 | 27·11 | 35·39 | | | | | 50–30 | | | |
| | | | 50 | 26·05 | 35·39 | | | | | 80–60 | | | |
| | | | 60 | 22·60 | 35·30 | | | | | 110–90 | | | |
| | | | 80 | 19·12 | 35·21 | | | | | 150–130 | | | |
| | | | 100 | 18·35 | 35·21 | | | | | 200–160 | | 14.0 | |
| | | | 150 | 15·88 | 35·16 | | | | | | | | |
| | | | 200 | 14·61 | 35·12 | | | | | | | | |
| | | | 4000 | 1·50 | 34·65 | | | | | | | | |
| | 27·92 | 35·54 | .. | .. | .. | .. | .. | .. | N 200 | 600–0 | 1.50 | 2.15 (11th) | Vertical haul. |
| | 27·76 | 35·52 | .. | .. | .. | 34·5 | 11.0 | .. | N 100 | 500–0 | 3.21 | | Vertical haul. |
| | | | | | | | | | N 100 | 1500–0 | | | |
| | | | | | | | | | N 200 | 2500–0 | | 4.40 | |
| | 27·68 | 35·03 | 30 | 27·21 | 35·16 | 42·0 | 9.21 | cr. oz. over gy. oz. | HN | 35–0 | 10.30 | | .. |
| | | | 60 | 25·19 | 35·24 | | | | | 65–35 | | | |
| | | | 100 | 20·35 | 35·10 | | | | | 140–100 | | | |
| | | | 150 | 15·93 | 35·05 | | | | | 190–150 | | 11.55 | |
| | | | 200 | 13·49 | 35·05 | | | | | | | | |
| | | | 3500 | 1·58 | 34·61 | | | | | | | | |
| | 27·82 | 35·23 | 3000 | 1·92 | 34·78 | 38·0 | 11.40 | r. | MT | 3385 | 16.36 | 17.38 | .. |
| | 27·62 | 34·60 | 40 | 27·70 | 35·25 | 32·0 | 13.36 | rd. cl. | HN | 40–0 | 14.15 | | .. |
| | | | 80 | 26·30 | 35·30 | | | | | 80–40 | | | |
| | | | 100 | 25·21 | 35·43 | | | | | 120–80 | | | |
| | | | 150 | 15·32 | 35·40 | | | | | 160–120 | | | |
| | | | 200 | 13·68 | 35·10 | | | | | 200–160 | | | |
| | | | 300 | 11·90 | 35·07 | | | | | 240–200 | | 15.55 | |
| | | | 3500 | 1·66 | 34·70 | | | | | | | | |
| | 27·30 | 34·46 | 2375 | 2·31 | 34·64 | .. | .. | y. oz. over gy. gl. oz. | MT | 2727 | 4.40 | 5.32 | .. |
| | 28·31 | 35·14 | 40 | 28·03 | 35·23 | 37·5 | 11.0 | Hard | HN | 40–0 | 12.20 | | .. |
| | | | 80 | 27·05 | 35·14 | | | | | 80–40 | | | |
| | | | 100 | 25·25 | 35·21 | | | | | 120–80 | | | |
| | | | 150 | 16·41 | 35·14 | | | | | 160–120 | | 15.00 | |
| | | | 3500 | 1·65 | 34·74 | | | | | | | | |

## Station List I.

| Station. | Position. S. | Position. E. | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° ′ ″ | ° ′ ″ | 1934. | | | | | | | | ″ | | |
| 137 | 0 36 00 | 73 12 48 | 23.iii | 10.25 | 46 | SW | 3 | .. | .. | b. ○ | 29·79 | 28·06 | .. |
| | (Anchorage, Addu Atoll.) | | | | | | | | | | | | |
| | N. | E. | | | | | | | | | | | |
| 138 | 2 12 00 | 73 16 48 to | 25.iii | 8.30 | 1900 | NW | 3 | NW | 3 | b. c. ◍ | 29·97 | 26·78 | .. |
| | 2 10 00 | 73 14 48 | | | | | | | | | | | |
| 139 | 2 13 30 | 73 09 00 | 25.iii | 16.38 | 57 | NW | 3 | .. | .. | o. p. ◍ | 29·88 | 27·00 | .. |
| | (Anchorage, E side, Kolumadulu Atoll.) | | | | | | | | | | | | |
| 140 | 2 39 54 | 73 22 12 to | 26.iii | 11.0 | 519 | WNW | 2 | WNW | 2 | b. c. ◍ | 29·84 | 28·39 | .. |
| | 2 41 42 | 73 18 48 | | | | | | | | | | | |
| 141 | 3 04 30 | 73 22 42 | 26.iii | 17.47 | 44 | NW | 3 | NW | 3–4 | b. c. ◍ | 29·80 | 28·00 | .. |
| | (Anchorage, W side, Mulakadu Atoll.) | | | | | | | | | | | | |
| 142A | 5 23 12 | 73 37 30 | 29.iii | 17.31 | 31 | N | 2 | N | 2 | b. c. ◐ | 29·28 | 28·72 | .. |
| | (Anchorage, E side, Fadiffolu Atoll.) | | | | | | | | | | | | |
| 142B | 5 23 12 | 73 37 06 | 30.iii | 6.35 | 37 | NW | 2 | .. | .. | b. c ◍ | .. | .. | .. |
| 143 | 5 15 48 | 73 22 48 to | 30.iii | 9.30 | 797 | NW | 2 | NW | 2 | b. c. ◍ | 29·84 | 28·89 | .. |
| | 5 13 42 | 73 23 36 | | | | | | | | | | | |
| 144 | 5 26 06 | 73 22 24 | 31.iii | 6.37 | 31 | S × E | 1 | S × E | 1 | b. c. ◐ | 29·82 | 28·06 | .. |
| | (Anchorage, W side, Fadiffolu Atoll.) | | | | | | | | | | | | |
| 145A | 4 58 42 | 73 16 24 | 31.iii | 17.30 | 494 | NNW | 3 | NNW | 3 | b. c. ◐ | 29·75 | 29·44 | .. |
| 145C | 4 58 42 | 73 16 24 | 1.iv | 15.30 | 494 | WNW | 3 | WNW | 3 | o. ◍ | 29·78 | 28·8 | .. |
| 145D | 4 58 42 | 73 16 24 | 2.iv | 3.55 | 494 | WNW | 3 | WNW | 3 | o. ◍ | 29·79 | .. | .. |
| 145E | 4 58 42 | 73 16 24 | 2.iv | 7.35 | 494 | WNW | 3 | WNW | 3 | b. c. ◐ | 29·84 | 28·1 | .. |
| 146 | 4 50 18 | 72 52 48 to | 2.iv | 13.20 | 37 | WNW | 3 | WNW | 3 | b. c. ◐ | 29·84 | 29·33 | .. |
| | 4 53 00 | 72 55 24 | | | | | | | | | | | |
| 147 | 4 53 12 | 72 54 30 | 2.iv | 16.25 | 27 | WNW | 3 | WNW | 3 | b. c. ◐ | 29·76 | 30·00 | .. |
| | (Anchorage, Horsburgh Atoll.) | | | | | | | | | | | | |
| 148 | 4 53 12 | 72 54 30 to | 3.iv | 6.30 | 27 | NW | 3 | NW | 3 | b. c. ◐ | .. | 28·6 | .. |
| | 4 51 24 | 72 53 06 | | | | | | | | | | | |
| 149 | 4 49 30 | 72 51 06 | 3.iv | 12.25 | 238 | NW | 3 | NW | 3 | b. c. ◐ | 29·83 | 29·28 | .. |
| 150 | 4 49 12 | 72 50 12 | 3.iv | 15.32 | 423 | NNW | 3 | NNW | 3 | b. c. ◐ | 29·76 | 28·89 | .. |
| 151 | 4 50 00 | 72 50 12 | 3.iv | 16.09 | 101 | NNW | 3 | NNW | 2 | b. c. ◐ | 29·76 | 28·89 | .. |
| 152 | 4 49 24 | 72 46 30 to | 4.iv | 8.30 | 878 | WNW | 3 | WNW | 2 | b. c. ○ | 29·84 | 28·89 | .. |
| | 4 48 42 | 72 40 30 | | | | | | | | | | | |

*ns of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| .. | .. | .. | .. | .. | .. | .. | w. m. | G | 46 | .. | .. | $H_2S$ present. |
| 27·9 | 34·52 | .. | .. | .. | .. | .. | c. cr. s. | AT | .. | .. | .. | Wire fouled. Net failed to fish |
| 28·7 | 34·14 | .. | .. | .. | .. | .. | cr. s. | G | 57 | .. | .. | .. |
| 28·7 | 35·17 | .. | .. | .. | .. | .. | c. s. | TD 4 | 515–525 | 12.24 | 13.17 | .. |
| .. | .. | .. | .. | .. | .. | .. | c. s. sh. cr. | G | 44 | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. | bl. and w. m. | G | 31 | .. | .. | $H_2S$ present. |
| .. | .. | .. | .. | .. | .. | .. | cm. m. | G | 37 | .. | .. | $H_2S$ present. |
| 29·5 | 34·20 | 770 | 7·88 | .. | .. | .. | gr. s. | AT | 797 | 11.10 | 12.18 | .. |
| .. | .. | .. | .. | .. | .. | .. | c. sh. s. | G | 31 | .. | .. | .. |
| 28·78 | 34·14 | .. | .. | .. | 34·0 | 17.43 | .. | .. | 37 | .. | .. | .. |
| 28·74 | 34·14 | 50 | 27·75 | 34·96 | 36·5 | 8.14 | gn. m. s. | N 100 | 50–0 | 15.50 | | Vertical haul. |
| | | 100 | 24·40 | 35·43 | | | | N 100 | 100–0 | | | |
| | | 300 | 11·49 | 35·07 | | | | N 100 | 300–0 | | | |
| | | 400 | 10·86 | 35·12 | | | | N 100 | 400–0 | | 17.30 | |
| .. | 34·38 | .. | .. | .. | .. | .. | gn. m. s. | N 100 | 50–0 | 3.55 | | Vertical haul. |
| | | | | | | | | N 100 | 100–0 | | | |
| | | | | | | | | N 100 | 300–0 | | | |
| | | | | | | | | N 100 | 400–0 | | 5.19 | |
| 29·2 | 34·29 | .. | .. | .. | .. | .. | .. | AT | 494 | 8.10 | 9.15 | .. |
| .. | .. | .. | .. | .. | .. | .. | sft. cm. m. | OT | 37 | 13.45 | 14.45 | .. |
| .. | .. | .. | .. | .. | .. | .. | sft. cm. m. | G | 27 | .. | .. | .. |
| 29·2 | 34·16 | .. | .. | .. | .. | .. | sft. cm. m. (cr. r. ?) | OT | 27–37 | 6.50 | 7.35 | Trawl caught on bottom. Both bridles parted. Trawl lost. |
| 29·1 | 34·42 | .. | .. | .. | .. | .. | cr. r. lth. | G | 238 | .. | .. | .. |
| | | | | | | | c. s. sh. cr. | TD 4 | 311–339 | 13.28 | 14.30 | .. |
| .. | .. | .. | .. | .. | .. | .. | hard | G | 423 | .. | .. | Grab came up empty. |
| 28·7 | 34·36 | .. | .. | .. | .. | .. | cr. r. | G | 101 | .. | .. | .. |
| 28·67 | 34·60 | 860 | 7·94 | .. | .. | .. | gn. s. | TD 4 | 609–915 | 10.0 | 11.0 | .. |

STATION LIST I.

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1934. | | | | | | | | ″ | | |
| 153 | 4 | 45 | 36 | 72 | 52 | 12 to | 4.iv | 13.20 | 256 | WNW | 3 | WNW | 3 | b. c. | .. | .. | .. |
| | 4 | 42 | 36 | 72 | 50 | 24 | | | | | | | | ◐ | | | |
| 154 | 4 | 47 | 00 | 72 | 50 | 54 to | 4.iv | 15.07 | 457 | NW | 3 | NW | 3 | b. c. | 29·74 | 29·44 | .. |
| | 4 | 45 | 30 | 72 | 47 | 42 | | | | | | | | ◐ | | | |
| | 4 | 31 | 00 | 72 | 42 | 30 to | 5.iv | 12.30 | 2249 | WNW | 3 | WNW | 3–4 | b. c. | 29·86 | 28·89 | .. |
| 155 | 4 | 31 | 30 | 72 | 38 | 00 | | | | | | | | ◐ | | | |
| 156 | 4 | 44 | 30 | 72 | 46 | 00 to | 6.iv | 8.50 | 1317 | NW | 3 | NW | 3 | b. c. | 29·88 | 28·56 | .. |
| | 4 | 41 | 12 | 72 | 42 | 48 | | | | | | | | ◐ | | | |
| 157 | 4 | 43 | 48 | 72 | 55 | 24 to | 6.iv | 15.45 | 229 | WNW | 3 | WNW | 3 | b. c. | 29·78 | 28·22 | .. |
| | 4 | 44 | 00 | 72 | 54 | 18 | | | | | | | | ◐ | | | |
| 158 | 4 | 42 | 30 | 72 | 42 | 30 to | 7.iv | 8.0 | 914 | WNW | 3 | WNW | 3 | b. c. | 29·86 | 28·33 | .. |
| | 4 | 36 | 48 | 72 | 48 | 54 | | | | | | | | ◐ | | | |
| 159 | 4 | 47 | 30 | 72 | 45 | 18 to | 7.iv | 12.0 | 1280 | WNW | 3 | WNW | 3 | b. c. | 29·84 | 28·06 | .. |
| | 4 | 48 | 00 | 72 | 46 | 42 | | | | | | | | ◐ | | | |
| 160 | 4 | 52 | 30 | 72 | 51 | 36 | 7.iv | 17.17 | 37 | NNW | 3 | NNW | 3 | b. c. | 29·76 | 28·06 | .. |
| | | | | | | | | | | | | | | ◐ | | | |
| 161 | 5 | 04 | 48 | 72 | 50 | 30 | 8.iv | 12.29 | 46 | NNE | 1 | Calm | | b. c. | 29·82 | 28·89 | .. |
| | (Anchorage, W side, S. Malosmadulu Atoll.) | | | | | | | | | | | | | ◐ | | | |
| 162 | 8 | 08 | 30 | 72 | 58 | 00 | 10.iv | 12.55 | 1829 | NNW | 1 | NNW | 3 | b. c. | 29·82 | 31·11 | .. |
| | | | | | | | | | | | | | | ◐ | | | |
| 163 | 8 | 15 | 18 | 73 | 01 | 36 | 11.iv | 9.47 | 274 | NNW | 1 | NNW | 3 | b. c. | 29·82 | 30·17 | .. |
| | | | | | | | | | | | | | | ◐ | | | |
| 164 | 8 | 15 | 24 | 73 | 01 | 30 | 11.iv | 10.23 | 183 | NNE | 1 | NNE | 1 | b. c. | .. | .. | .. |
| | | | | | | | | | | | | | | ◐ | | | |
| 165 | 8 | 15 | 12 | 73 | 01 | 30 | 11.iv | 10.53 | 366 | NNE | 1 | NNE | 2 | b. c. | 29·84 | 30·33 | .. |
| | | | | | | | | | | | | | | ◐ | | | |
| 166 | 6 | 55 | 18 | 67 | 11 | 18 to | 23.iv | 10.0 | 4793 | NW | 2–3 | NW | 3 | b. c. | 29·88 | 28·39 | Slight confused swell |
| | 6 | 48 | 54 | 67 | 14 | 00 | | | | | | | | ◐ | | | |
| 167 | 7 | 11 | 48 | 63 | 05 | 36 to | 25.iv | 6.35 | 4042 | WNW | 3 | WNW | 3 | b. c. | 29·86 | 28·44 | .. |
| | 7 | 11 | 24 | 62 | 59 | 30 | | | | | | | | ◐ | | | |
| 168 | 7 | 14 | 00 | 60 | 38 | 42 to | 26.iv | 3.30 | 2937 | NE | 3 | NE | 3 | b. c. | 29·81 | 28·78 | Slight SE swell |
| | 7 | 14 | 18 | 60 | 39 | 30 | | | | | | | | ◐ | | | |
| 169 | 7 | 16 | 12 | 60 | 33 | 36 to | 26.iv | 12.15 | 2711 | E × S | 3 | E × S | 3 | b. c. | 29·89 | 29·72 | Slight SE swell |
| | 7 | 17 | 00 | 60 | 34 | 12 | | | | | | | | ◐ | | | |
| 170 | 7 | 38 | 48 | 58 | 18 | 30 to | 27.iv | 6.30 | 3676 | E | 3 | E | 3 | b. c. | 29·86 | 28·89 | .. |
| | 7 | 38 | 00 | 58 | 25 | 24 | | | | | | | | ◐ | | | |
| 171 | 9 | 07 | 06 | 55 | 27 | 06 to | 28.iv | 17.15 | 3872 | NNW | 2 | NNW | 3 | b. c. | 29·83 | 28·89 | Slight E swell |
| | 9 | 08 | 48 | 55 | 31 | 48 | | | | | | | | ◐ | | | |

*ons of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| Temp. (° Cent.). | S. ‰ | Depth (metres). | Temp. (° Cent.). | S. ‰ | Depth (metres). | Time. | | | | From | To | |
| .. | .. | .. | .. | .. | .. | .. | .. | TD 4 | 256–293 | 13.44 | 14.14 | .. |
| 29·2 | 34·54 | .. | .. | .. | .. | .. | .. | AT | 457 | 15.32 | 16.22 | Net badly torn. |
| 28·7 | 34·40 | .. | .. | .. | .. | .. | .. | MT | 2249 | 13.50 | 14.21 | .. |
| 28·9 | 34·51 | .. | .. | .. | .. | .. | .. | AT | ? | 11.15 | 12.15 | Trawl never on the bottom. |
| 28·9 | 34·45 | .. | .. | .. | .. | .. | cr. r. | TD 4 | 229 | 16.00 | 16.30 | .. |
| 28·7 | 34·54 | .. | .. | .. | .. | .. | .. | AT | 786–1170 | 8.57 | 9.56 | .. |
| 29·2 | 34·51 | .. | .. | .. | .. | .. | .. | MT | 914–1463 | 13.10 | 14.03 | .. |
| .. | .. | .. | .. | .. | .. | .. | cm. m. | G | 37 | .. | .. | $H_2S$ present. |
| 29·2 | 34·54 | .. | .. | .. | .. | .. | c. s. | G | 46 | .. | .. | .. |
| 31·9 | 34·74 | .. | .. | .. | .. | .. | gy. m. | AT | 1829–2051 | 14.55 | 15.36 | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. s. | G | 274 | | | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. s. | G | 183 | | | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. s. | G | 366 | | | .. |
| 29·92 | 35·03 | 4000 | 1·78 | 34·94 | 42·0 | 16.30 | rd. cl.; m. nd. | MT | 4793–4850 | 11.56 | 13.56 | Net badly torn. |
| 29·42 | 34·97 | 40 | 29·05 | 35·14 | 45·0 | 8.18 | rd. cl. | HN | 40–0 | 10.30 | | .. |
| | | 80 | 26·40 | 35·57 | | | | | 90–50 | | | |
| | | 100 | 24·58 | 35·52 | | | | | 140–100 | | | |
| | | 150 | 19·10 | 35·35 | | | | | 190–150 | | | |
| | | 200 | 18·39 | 35·17 | | | | | 300–250 | | 11.55 | |
| | | 300 | 12·68 | 35·14 | | | | | | | | |
| | | 2200 | 2·43 | 34·87 | | | | | | | | |
| 29·0 | 35·39 | .. | .. | .. | .. | .. | r. | MT | 2937–3182 | 5.40 | 7.40 | Frame broken; net badly torn. |
| 29·59 | 35·41 | 40 | 27·88 | 35·53 | 36·0 | 14.10 | .. | HN | 40–0 | 14.40 | | .. |
| | | 80 | 24·88 | 35·55 | | | | | 90–50 | | | |
| | | 100 | 23·50 | 35·46 | | | | | 140–100 | | | |
| | | 150 | 19·94 | 35·41 | | | | | 190–150 | | | |
| | | 200 | 15·66 | 35·32 | | | | | 240–200 | | 15.40 | |
| | | 300 | 12·12 | 35·23 | | | | | | | | |
| | | 2500 | 2·33 | 34·79 | | | | | | | | |
| 28·80 | 35·53 | 3500 | 1·93 | 34·87 | 39·0 | 9.40 | gl. oz. | AT | 3676 | 16.0 | 17.0 | .. |
| 29·12 | 35·42 | 2000 | 3·68 | 34·87 | .. | .. | .. | AT | 3840–3872 | 20.0 | 22.0 | Bigelow tube lost. |

## Station List I.

| Station | Position. N. | | | E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1934. | | | | | | | | ″ | | |
| 172 | 9 | 40 | 24 | 54 | 33 | 36 to | 29.iv | 13.15 | 4720 | NE | 2 | NE | 2 | b. c. ◐ | 29·81 | 29·22 | .. |
| | 9 | 42 | 18 | 54 | 39 | 00 | | | | | | | | | | | |
| 173 | 9 | 59 | 30 | 52 | 57 | 36 to | 30.iv | 9.30 | 4499 | WSW | 2 | WSW | 2 | b. c. ◐ | 29·91 | 28·33 | .. |
| | 9 | 56 | 42 | 53 | 11 | 42 | | | | | | | | | | | |
| 174 | 12 | 02 | 06 | 51 | 38 | 48 to | 1.v | 12.57 | 865 | S | 4 | S | 4 | b. c. ◐ | 29·90 | 28·78 | .. |
| | 12 | 06 | 06 | 51 | 38 | 00 | | | | | | | | | | | |
| 175 | 12 | 37 | 24 | 51 | 21 | 12 to | 1.v | 19.20 | 1618 | ESE | 4 | ESE | 4 | b. c. ◐ | 29·86 | 28·78 | .. |
| | 12 | 43 | 18 | 51 | 19 | 12 | | | | | | | | | | | |
| 176 | 12 | 04 | 06 | 50 | 38 | 36 | 2.v | 9.30 | 695 | S | 2–3 | S | 2–3 | b. c. ◐ | 29·90 | 27·78 | .. |
| 177 | 12 | 01 | 54 | 50 | 39 | 12 | 2.v | 13.53 | 366 | NNE | 2–3 | NNE | 2–3 | b. c. ◐ | 29·90 | 29·33 | .. |
| 178 | 12 | 00 | 36 | 50 | 40 | 06 | 2.v | 15.50 | 91 | NNE | 3 | NNE | 3 | b. c. ◐ | 29·84 | 28·61 | .. |
| 179A | 12 | 02 | 06 | 50 | 40 | 12 | 2.v | 16.36 | 310 | NNE | 3 | NNE | 3 | b. c. ◐ | .. | .. | .. |
| 179B | ,, | ,, | ,, | | ,, | ,, | 2.v | 16.54 | 275 | NNE | 3 | NNE | 3 | b. c. ◐ | .. | .. | .. |
| 180 | 12 | 03 | 24 | 50 | 40 | 12 | 2.v | 17.20 | 366 | NNE | 3 | NNE | 3 | b. c. ◐ | .. | .. | .. |
| 181 | 13 | 25 | 06 | 51 | 09 | 12 to | 3.v | 7.03 | 1982 | SE | 4 | SE | 4 | b. c. ◐ | 29·92 | 28·11 | .. |
| | 13 | 28 | 36 | 51 | 08 | 00 | | | | | | | | | | | |
| 182 | 13 | 57 | 48 | 51 | 00 | 24 to | 3.v | 15.25 | .. | SE | 3 | SE | 3 | b. c. ◐ | 29·86 | 28·89 | Slight SE swell |
| | 13 | 58 | 00 | 51 | 02 | 12 | | | | | | | | | | | |
| 183 | 14 | 40 | 06 | 50 | 53 | 36 to | 4.v | 7.0 | 1105 | SE | 2 | SE | 2 | b. c. ◐ | 29·94 | 28·89 | Slight SE swell |
| | 14 | 40 | 42 | 50 | 53 | 00 | | | | | | | | | | | |
| 184 | 14 | 36 | 06 | 51 | 00 | 18 to | 4.v | 9.55 | 1269 | SE | 2 | SE | 2 | b. c. ◐ | 29·90 | 29·33 | Slight SE swell |
| | 14 | 38 | 42 | 50 | 57 | 42 | | | | | | | | | | | |
| 185 | 13 | 48 | 06 | 49 | 16 | 48 to | 5.v | 6.25 | 2001 | E × S | 3 | E × S | 3 | b. c. ◐ | 29·90 | 28·89 | Slight SE swell |
| | 13 | 48 | 36 | 49 | 16 | 24 | | | | | | | | | | | |
| 186 | 13 | 32 | 30 | 49 | 13 | 06 to | 5.v | 13.30 | .. | E | 4 | E | 4 | b. c. ◐ | 29·82 | 28·89 | Slight SE swell |
| | 13 | 32 | 00 | 49 | 15 | 18 | | | | | | | | | | | |

*ons of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | | | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | Sub-surface. | | | Transparency of the water (SD reading). | | Nature of bottom. | Gear. | Depth (metres). | Time. | | |
| Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| 30·1 | 35·59 | .. | .. | .. | .. | .. | .. | N 100 | 200–0 | 14.37 | | 510 metres of wire out. |
| | | | | | | | | N 100 | 400–0 | | | 820 metres of wire out. |
| | | | | | | | | N 100 | 850–0 | | | 1500 metres of wire out. |
| | | | | | | | | N 100 | 2040–0 | | | 2600 metres of wire out. Net lost. |
| | | | | | | | | N 200 | 2091–0 | | 16.37 | 2665 metres of wire out. Net badly torn.* |
| 28·78 | 35·28 | .. | .. | .. | 29·0 | 15.35 | w. m. | .. | .. | .. | .. | .. |
| 28·60 | 35·84 | 40 | 26·25 | 35·79 | 28·5 | 14.15 | gn. m. | HN | 40–0 | 14.30 | | Repeat of Sta. 23. |
| | | 80 | 25·02 | 36·08 | | | | | 90–50 | | | |
| | | 100 | 23·39 | 35·84 | | | | | 140–100 | | | |
| | | 150 | 17·88 | 35·52 | | | | | 200–150 | | 15.10 | |
| | | 200 | 16·47 | 35·39 | | | | | | | | |
| | | 800 | 10·27 | 35·39 | | | | | | | | |
| 28·22 | 35·95 | 1365 | 6·63 | 35·16 | .. | .. | gn. m. | .. | .. | .. | .. | Repeat of Sta. 30. |
| 27·9 | 36·04 | .. | .. | .. | .. | .. | gn. m. s. | AT | 655–732 | 10.20 | 11.50 | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. m. r. | AT | 274–366 | 14.20 | 14.56 | Trawl frame badly bent. Net torn. |
| 26·9 | 36·04 | .. | .. | .. | .. | .. | c. gn. s. | G | 91 | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. | r. | G | 310 | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. m. s. | G | 275 | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. | gn. m. s. | G | 397 | .. | .. | .. |
| 27·85 | 36·11 | 1580 | 5·42 | 34·90 | 38·0 | 9.55 | gn. m. | .. | .. | .. | .. | Repeat of Sta .31. |
| 28·35 | 36·06 | 1965 | 3·59 | 34·95 | 22·0 | 15.30 | .. | .. | .. | .. | .. | Repeat of Sta. 38. |
| 29·10 | 36·29 | 1000 | 10·79 | 35·66 | 32·0 | 8.30 | .. | .. | .. | .. | .. | Repeat of Sta. 32. |
| 29·5 | 36·24 | .. | .. | .. | .. | .. | gn. m. | AT | 1270 | 12.05 | 14.50 | .. |
| 28·3 | 36·31 | .. | .. | .. | .. | .. | gn. m. | AT | 2000 | 8.45 | 10.16 | .. |
| .. | .. | .. | .. | .. | .. | .. | .. | N 100 | 250–0 | 14.16 | | 510 metres of wire out. |
| | | | | | | | | N 100 | 575–0 | | | 880 metres of wire out. Stop slipped. |
| | | | | | | | | N 100 | 600–0 | | | 1150 metres of wire out. |
| | | | | | | | | N 200 | 952–0 | | 15.16 | 1500 metres of wire out.* |

STATION LIST I.—

| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ° | ′ | ″ | 1934. | | | | | | | | ″ | | |
| 187 | 12 | 45 | 30 | 48 | 53 | 42 to | 5.v | 22.0 | 1651 | SE | 3 | SE | 3 | b. c. l. ◐ | 29·88 | 28·33 | .. |
| | 12 | 44 | 12 | 48 | 53 | 48 | | | | | | | | | | | |
| 188 | 13 | 43 | 18 | 47 | 56 | 54 to | 6.v | 10.30 | 528 | SE | 3 | SE | 3 | b. c. ◐ | 29·92 | 28·89 | .. |
| | 13 | 46 | 00 | 47 | 50 | 42 | | | | | | | | | | | |
| 189 | 13 | 51 | 30 | 47 | 49 | 12 | 6.v | 16.24 | 91 | SE | 3 | SE | 3 | b. c. ◐ | 29·82 | 29·00 | .. |
| 190 | 13 | 49 | 00 | 47 | 49 | 12 | 6.v | 16.50 | 183 | SE | 3 | SE | 3 | b. c. ◐ | .. | .. | .. |
| 191 | 13 | 46 | 30 | 47 | 48 | 54 | 6.v | 17.18 | 274 | SE | 3 | SE | 3 | b. c. ◐ | .. | .. | .. |
| 192 | 13 | 44 | 48 | 47 | 48 | 54 | 6.v | 17.40 | 366 | SE | 3 | SE | 3 | b. c. ◐ | .. | .. | .. |
| 193 | 13 | 06 | 12 | 46 | 24 | 30 to | 7.v | 7.35 | 1061 | SE | 2 | SE | 2 | b. c. ◐ | 29·92 | 28·78 | .. |
| | 13 | 03 | 00 | 46 | 21 | 42 | | | | | | | | | | | |
| 194 | 13 | 16 | 00 | 46 | 20 | 24 to | 7.v | 13.0 | 220 | ENE | 2 | ENE | 1 | b. c. ◍ | 29·94 | 29·44 | .. |
| | 13 | 16 | 36 | 46 | 14 | 00 | | | | | | | | | | | |
| 195 | 12 | 31 | 06 | 45 | 21 | 00 | 8.v | 7.0 | 1042 | SE | 2 | SE | 2 | b. c. ◐ | 29·94 | 29·17 | .. |
| 196 | 12 | 38 | 12 | 45 | 11 | 00 | 8.v | 10.40 | 375 | ESE | 3 | ESE | 3 | b. c. ◐ | 29·96 | 29·44 | .. |
| 197 | 11 | 57 | 18 | 45 | 16 | 24 to | 13.v | 16.0 | 1063 | ENE | 3 | ENE | 3 | b. ○ | 29·88 | 29·17 | Slight ESE swell |
| | 11 | 59 | 06 | 45 | 16 | 18 | | | | | | | | | | | |
| 198 | 11 | 20 | 24 | 45 | 06 | 00 to | 13.v | 23.35 | 1491 | E | 4 | E | 4 | b. ○ | 29·88 | 28·11 | Slight ESE swell |
| | 11 | 22 | 24 | 45 | 05 | 12 | | | | | | | | | | | |
| 199 | 10 | 59 | 12 | 45 | 02 | 42 to | 14.v | 5.15 | 1434 | E | 3–4 | E | 3–4 | b. ○ | 29·86 | 28·33 | Slight E swell |
| | 10 | 59 | 06 | 45 | 02 | 06 | | | | | | | | | | | |
| 200 | 11 | 56 | 48 | 43 | 38 | 42 to | 15.v | 8.15 | 1463 | E | 2 | E | 2 | b. c. ◐ | 29·88 | 29·78 | .. |
| | 11 | 57 | 00 | 43 | 35 | 12 | | | | | | | | | | | |
| 201 | 12 | 12 | 30 | 43 | 45 | 54 to | 15.v | 13.15 | 375 | E | 3 | E | 3 | b. c. ◐ | 29·88 | 29·72 | .. |
| | 12 | 12 | 00 | 43 | 41 | 30 | | | | | | | | | | | |
| 202 | 12 | 23 | 12 | 43 | 54 | 12 to | 15.v | 17.0 | 439 | E | 3 | E | 3 | b. c. ◐ | 29·80 | 29·78 | .. |
| | 12 | 24 | 00 | 43 | 51 | 36 | | | | | | | | | | | |
| 203 | 13 | 35 | 06 | 42 | 35 | 24 to | 16.v | 7.10 | 229 | ESE | 3 | ESE | 3 | b. c. ◐ | 29·86 | 28·72 | .. |
| | 13 | 35 | 24 | 42 | 34 | 30 | | | | | | | | | | | |
| 204 | 13 | 41 | 24 | 42 | 31 | 30 to | 16.v | 9.20 | 110 | ESE | 3 | ESE | 3 | b. c. ◐ | .. | .. | .. |
| | 13 | 42 | 30 | 42 | 31 | 12 | | | | | | | | | | | |
| 205 | 13 | 47 | 30 | 42 | 28 | 18 | 16.v | 11.20 | 177 | N | 3 | N | 3 | b. c. ◐ | 29·86 | 29·33 | .. |
| 206 | 13 | 57 | 30 | 42 | 35 | 24 | 16.v | 13.01 | 256 | N | 3 | N | 3 | b. c. ◐ | .. | .. | .. |
| 207 | 14 | 08 | 56 | 42 | 19 | 00 | 16.v | 16.35 | 375 | N | 3 | N | 3 | b. c. ◐ | 29·76 | 28·78 | .. |
| 208 | 15 | 48 | 30 | 41 | 30 | 30 | 17.v | 6.0 | 732 | NW | 3 | NW | 3 | b. c. ◐ | 29·86 | 28·22 | .. |
| 209 | 15 | 54 | 36 | 41 | 13 | 00 | 17.v | 12.10 | 366 | NW | 3 | NW | 3 | b. ○ | 29.84 | 29·00 | .. |

*...ions of H.E.M.S. "Mabahiss".*

| Hydrological observations. | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | Gear. | Depth (metres). | Time. | | |
| th ...es). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Time. | | | | From | To | |
| | 28·19 | 36·27 | 1000 | 11·53 | 35·90 | .. | .. | gy. gn. m. | .. | .. | .. | .. | .. |
| | 28·94 | 36·27 | 200 | 15·66 | 35·66 | .. | .. | gn. m. | AT | ? | 11.40 | 12.42 | Net came up empty. |
| | | | 400 | 13·82 | 35·44 | | | | AT | 528 | 13.50 | 14.50 | Net filled with mud and burst. |
| | 29·2 | 36·29 | .. | .. | .. | .. | .. | gn. s. m. | G | 91 | .. | .. | $H_2S$ present. |
| | .. | .. | .. | .. | .. | .. | .. | gn. s. m. | G | 183 | .. | .. | .. |
| | .. | .. | .. | .. | .. | .. | .. | gn. s. m. | G | 274 | .. | .. | .. |
| | .. | .. | .. | .. | .. | .. | .. | sft. d. gn. m. | G | 366 | .. | .. | .. |
| | 23·69 | 36·38 | 1000 | 10·86 | 35·81 | .. | .. | gn. m. | AT | 1061–1080 | 9.30 | 11.0 | .. |
| | .. | .. | .. | .. | .. | .. | .. | .. | AT | 220 | 13.30 | 15.33 | .. |
| | 28·81 | 36·29 | .. | .. | .. | 44·0 | 8.50 | .. | .. | .. | .. | .. | .. |
| | 29·30 | 36·29 | .. | .. | .. | 31·5 | 12.30 | .. | .. | .. | .. | .. | Repeat of Sta. 36. |
| | 28·98 | 36·26 | .. | .. | .. | 31·0 | 16.20 | .. | .. | .. | .. | .. | Repeat of Sta. 20 |
| | 27·95 | 36·29 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Repeat of Sta. 21. |
| | 28·72 | 36·38 | .. | .. | .. | 28·5 | 6.55 | .. | .. | .. | .. | .. | Repeat of Sta. 18. |
| | 30·10 | 36·53 | 1175 | 15·96 | 37·39 | .. | .. | .. | .. | .. | .. | .. | Repeat of Sta. 14. |
| | 29·48 | 36·42 | 350 | 17·86 | 37·01 | 35·5 | 14.45 | .. | .. | .. | .. | .. | Repeat of Sta. 13. |
| | 29·05 | 36·44 | 500 | 22·30 | 39·38 | 26·0 | 17.45 | .. | .. | .. | .. | .. | Repeat of Sta. 12. |
| | 28·28 | 36·42 | 220 | 22·12 | 40·44 | 23·5 | 8.15 | .. | .. | .. | .. | .. | Repeat of Sta. 9. |
| | 28·62 | 36·47 | 95 | 22·54 | 40·43 | 22·5 | 10.20 | gn. m. r. | G | 110 | .. | .. | Repeat of Sta. 8. |
| | 28·9 | 36·47 | .. | .. | .. | .. | .. | r. | G | 177 | .. | .. | .. |
| | 28·74 | 36·62 | 241 | 21·75 | 40·55 | 23·5 | 14.05 | gr. br. s. m. r. | G | 256 | .. | .. | .. |
| | .. | .. | .. | .. | .. | .. | .. | gr. br. m. pt. | G | 375 | .. | .. | .. |
| | 27·86 | 37·25 | 700 | 21·65 | 40·59 | 30·0 | 7.25 | gr. br. m. r. | TD 4 | 732–805 | 8.54 | 9.56 | .. |
| | 29·0 | 38·04 | .. | .. | .. | .. | .. | gr. br. m. r. | TD 4 | 366 | 12.33 | 13.00 | .. |

## Station List II.

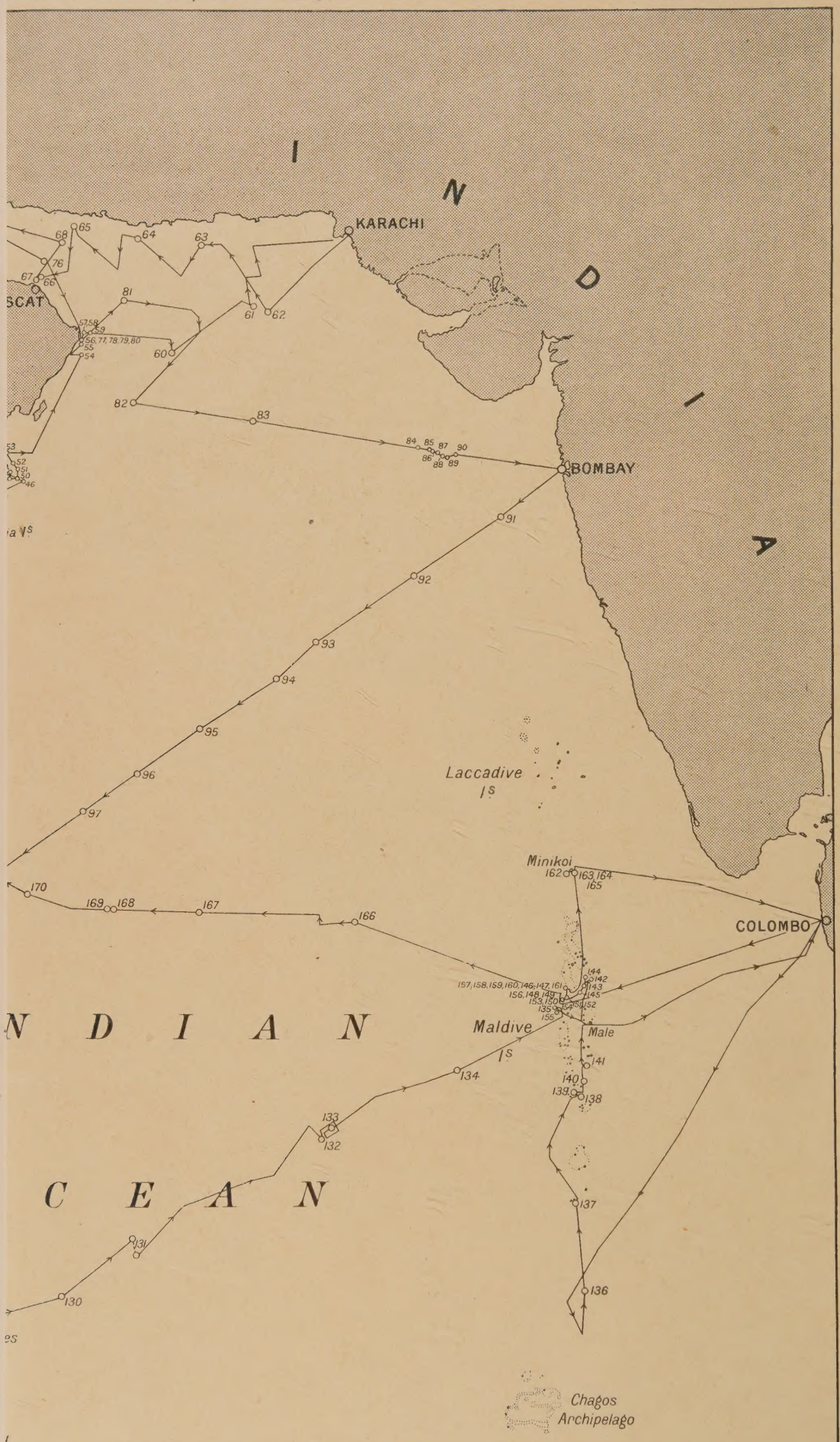
| Station. | Position. N. | | | Position. E. | | | Date. | Hour. | Sounding (metres). | Wind. Direction. | Wind. Force. | Sea. Direction. | Sea. Force. | Weather. | Barometer. | Air temp. (° Cent.). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M.B. | ° | ′ | ″ | ° | ′ | ″ | 1933. | | | | | | | | ″ | | |
| I (*a*) | 13 | 39 | 30 | 42 | 43 | 00 | 17.ix | 10.0 | 29 | .. | .. | .. | .. | .. | .. | .. | .. |
| | Bay between Gt. Hanish and Suyul Hanish Islands, Red Sea | | | | | | | | | | | | | | | | |
| (*b*) | .. | .... | | .. | .. | .. | 17.ix | 11.0 | 29 | .. | .. | .. | .. | .. | .. | .. | .. |
| (*c*) | .. | .. | .. | .. | .. | .. | 17.ix | 15.30 | 26 | .. | .. | .. | .. | .. | .. | .. | .. |
| (*d*) | .. | .. | .. | .. | .. | .. | 17.ix | 16.0 | 26 | .. | .. | .. | .. | .. | .. | .. | .. |
| M.B. II (*a*) | 17 | 33 | 30 | 56 | 01 | 30 | 28.x | 9.55 | 11 | .. | .. | .. | .. | .. | .. | .. | .. |
| | Coastal zone N. of Jezirat Hallaniya, Khorya Morya Islands, Arabian coast | | | | | | | | | | | | | | | | |
| (*b*) | .. | .. | .. | .. | .. | .. | 28.x | 11.30 | 26 | .. | .. | .. | .. | .. | .. | .. | .. |
| (*c*) | .. | .. | .. | .. | .. | .. | 28.x | 12.45 | 29 | .. | .. | .. | .. | .. | .. | .. | .. |

*...ons of Motor Boat.*

| Hydrological observations. | | | | | | | Transparency of the water (SD reading). | | Nature of bottom. | Biological observations. | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface. | | | Sub-surface. | | | | | | | Gear. | Depth (metres). | Time. | | |
| ... | Temp. (° Cent.). | S. °/₀₀. | Depth (metres). | Temp. (° Cent.). | S. °/₀₀. | | Depth (metres). | Time. | | | | From | To | |
| .. | .. | .. | .. | .. | .. | | .. | .. | s. sh. cr. | RD | ? | 10.0 | 10.20 | Net apparently not on bottom. |
| .. | .. | .. | .. | .. | .. | | .. | .. | s. sh. cr. | RD | 29 | 11.0 | 11.25 | .. |
| .. | .. | .. | .. | .. | .. | | .. | .. | cr. r. | RD | 26 | 15.30 | .. | Dredge fast in bottom. |
| .. | .. | .. | .. | .. | .. | | .. | .. | s. sh. cr. | RD | 26 | 16.0 | 16.15 | .. |
| .. | .. | .. | .. | .. | .. | | .. | .. | c. s. | RD | 11 | 9.55 | 10.25 | . |
| 26·1 | 36·00 | 10 | 25·9 | 35·90 | .. | | .. | .. | .. | .. | .. | .. | .. | . |
| | | 20 | 25·5 | 35·905 | | | | | | | | | | |
| .. | .. | .. | .. | .. | .. | | .. | .. | c. s. | RD | 29 | 12.45 | 1.15 | .. |

CAIRO
SUEZ
EGYPT
EL - HEJAZ
EL - HASA
OMAN
JIDDA
ARABIA
RED SEA
PORT SUDAN
SUAKIN
ANGLO-
EGYPTIAN
SUDAN
YEMEN
HADRAMAUT
MASSAWA
Ras Fartak
ADEN
Perim
Socotra
ABYSSINIA
Guardafui
BERBERA
SOMALILAND
AFRICA
KENYA
COLONY
Pemba
ZANZIBAR
MOMBASA
TANGANYIKA
TERRITORY
Mahe
Seychell
Aminante Is
Mafia
Aldabra Is
Cerf I
Coetivy
SEE INSET FOR THIS AREA

DIAN OCEAN, 1933 - 34.




I. E. M. S. "MABAHISS"